Ontario

Select Committee on Energy

Final Report on Toward a Balanced Electricity System

2nd Session, Thirty Third Parliament
35 Elizabeth II

SELECT COMMITTEE ON ENERGY

Ontario

LEGISLATIVE ASSEMBLY
ASSEMBLÉE LÉGISLATIVE

COMITÉ SPÉCIAL SUR L'ÉNERGIE

The Honourable Hugh Edighoffer, M.P.P.
Speaker of the Legislative Assembly

Sir,

Your Select Committee on Energy has the honour to present the Report required by its Order of Reference and recommends that it be considered by the House at the earliest opportunity.

Philip W. Andrewes, M.P.P.
Chairman

Queen's Park
July 1986

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PREFACE

The Select Committee on Energy was appointed on July 10, 1985, by the Legislative Assembly of the Province of Ontario to "inquire into and report within ten months on Ontario Hydro Affairs." Under the chairmanship of Mr. Philip Andrewes (Lincoln), the Committee held two sessions. In its first session, the Committee reviewed the Darlington Nuclear Generating Station - a $10.9 billion project currently under construction on the shore of Lake Ontario. Nineteen days of hearings were conducted in September and early October, 1985, during which the Committee examined the need for Darlington as a means to lowering the cost of generation. The Committee found that, with 65% of the project's costs irrevocably committed, the cost advantages of Darlington over coal-fired stations exist within a wide range of financial and demand variables. The Committee decided that Units 1 and 2, with 80% of the costs committed, could not be cancelled on economic grounds. But, questions remained about the viability of Units 3 and 4, which are less than 50% completed. The Committee was concerned about Ontario Hydro's focus on supply-side alternatives and the apparent lack of data on, and analysis of, demand-side alternatives to Darlington. The Committee's review also raised serious concerns about Ontario Hydro's planning process and about the delineation of operating and policy-making responsibilities between Ontario Hydro and the Government.

Accordingly, in its December 1985 report on Darlington, the Committee recommended that "no further significant contracts for Units 3 and 4 should be let for materials not required for construction during the next six months while the Committee studies demand and supply options".[1]

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1. See Note 1 at end of text for a list of the three recommendations from the Committee's Report on the Darlington Nuclear Generating Station.

In preparation for public hearings on demand and supply options, the Committee commissioned short reviews of Ontario Hydro's demand/supply option study (DSOS), planning practices in other jurisdictions, hidden costs and subsidies of electricity options and conservation potential. Also, a discussion paper was released prior to the hearings to provide Committee members and interested parties with background information on the issues to be reviewed.

The Committee conducted twelve days of hearings (Appendix A) in April, 1986, to review demand and supply options, Ontario Hydro's DSOS and the process of choosing options. During this period, the Committee heard from 64 witnesses (Appendix B), filed 79 exhibits (Appendix C) and received written submissions from 17 public and interest groups (Appendix D).

Select Committee On Energy

TOWARD A BALANCED ELECTRICITY SYSTEM

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INTRODUCTION AND EXECUTIVE SUMMARY

The primary purpose of electric power planning is to ensure that the people of Ontario receive energy services at the lowest possible cost, and in a manner that is consistent with the principles of equity, environmental soundness and freedom of choice.

This purpose, however, is not easily fulfilled. The demands of the policy and planning environment have changed dramatically over the past 10-15 years. Greater uncertainties in the environment for electric power planning have made planning a very difficult task for Ontario Hydro, at a time when the costs of an error have increased substantially. To reduce this greater uncertainty and manage risk Ontario must strive for a flexible and more balanced system. We have found that flexiblity and balance are available through increased energy productivity, with all of its attendant societal benefits, and a number of smaller, more flexible supply options. Consequently, the need and desirability of additional commitments to nuclear are in question more now than ever before. However, with Darlington two-thirds complete, we find ourselves unable to respond to the imperatives for system flexibility and balance. At this time, our choices are circumscribed. Too little is known about the cost and timing of conservation to risk thousands of jobs and several billion dollars of investment. And, no other supply options can compete with the low incremental costs of the Darlington units. Therefore, proceeding with Darlington is the lowest risk option for the province in the short term (Chapter I).

The issues and concerns about electric power planning have not gone unnoticed in previous public reviews. In fact, the Committee found a marked similarity between its findings and the conclusion and recommendations of past reviews. The need for a greater emphasis on demand-side management and on alternative generation have been major recurring themes. However, when looked at in the context of 14 years of energy policy debate in Ontario,

it is apparent that our province has been slow to respond to the realities of the new planning environment. We have developed little capabilty for acquiring conservation resources and our system has become increasingly centralized.

With Darlington coming on stream, there is no urgent need for new resource options. But, Ontario must take this opportunity to build a stronger demand-side capability so that we can choose freely from the entire spectrum of resource options and not have our choices circumscribed in the future. In doing so, the Government must overcome a number of barriers within Ontario Hydro and in the general marketplace which may inhibit progress towards a more balanced electricity system. These barriers are outlined in Chapter II.

In Chapter III, the Committee develops its plan for moving Ontario toward a more balanced electricity system. Recommendations are made for changes at Ontario Hydro, action by the Ministry of Energy and for changes to the decision-making process.

Ontario Hydro must be given strong direction to pursue conservation and build a more balanced system. Its planning process must be improved to consider demand and supply options equally. The process must be based on end-use models and proper scenario analysis. Therefore, Hydro must give a high priority to building its end-use data base and must gain knowledge about conservation programs through the immediate launching of major demonstration projects.

To allow Ontario Hydro to pursue the full potential of cost-effective conservation the Government must amend the Power Corporation Act and require Ontario Hydro to develop a comprehensive strategy to distribute the benefits of conservation throughout the province. And, Ontario Hydro must be explicitly prohibited from using screening tests which exclude conservation programs that are in the long-term interest of the province as a whole.

The Government must take steps to promote conservation in the marketplace by advocating a stronger building code and the use of appliance efficiency standards. And the Ministry of Energy should develop detailed plans for promoting parallel generation to help diversify Ontario's resource base.

Our legal and institutional framework has been ineffective in dealing with the growing complexity of planning issues. There has been too little opportunity for building public consensus on important and controversial planning issues. Government input has been limited. Current review bodies do not have adequate authority or sufficient resources to do a good job. As a result, important matters of public policy have become matters of Ontario Hydro's corporate strategy. Government, the public and Ontario Hydro have not been working together in the cooperative manner necessary for dealing with the important and complex issues.

The Committee has established guidelines for the submission of resource plans. These guidelines develop formal mechanisms to gather input from informed groups and the general public early in the planning process. The plans must then be thoroughly evaluated by the Ontario Energy Board in a public hearing. And, finally, once government policy has been developed regarding the plans, these policies must be properly enforced. The Committee recommends that, with regulatory power over rates, the Ontario Energy Board play a key role in the enforcement process.

The Committee believes, therefore, that the best contribution it can make to public policy in the area of demand and supply options is to develop an action plan that can assist Ontario Hydro and the province as they strive to build a more balanced electricity system. While recognizing and seeking to preserve the many advantages of our current system, the Committee's action plan focuses on lowering the barriers which inhibit the pursuit of this goal. Our action plan facilitates orderly, but progressive, change, taking full advantage of the time we have due to the current surplus.

The Committee's goal . . .

> to build a more balanced electric power system which can deliver power at the lowest economic and social costs to the people of Ontario.

The Committee's approach . . .

> to improve Ontario Hydro's planning and establish a decision-making process that allows for meaningful public input on key planning issues and ensures that political control over the determination of our electricity future is more effective.

COMPENDIUM OF RECOMMENDATIONS

Darlington and Nuclear Energy:

1. Because of Darlington's low incremental cost and the uncertainties associated with other short-term options, all units of Darlington should proceed on schedule (page 28).

2. In view of the established potential of other supply options and the apparent potential for pursuing demand management initiatives, no further commitment should be made for additional nuclear power stations at this time (page 29).

3. The Minister of Energy should appoint an independent panel of internationally-recognized experts to review, on a priority basis, the safety of the design, operating procedures and emergency plans associated with Ontario Hydro's CANDU nuclear generating plants. The panel should prepare a report to the Minister which should also be made available to Members of the Legislature (page 30).

Ontario Hydro's Planning:

4. The Ontario Government should specify the social, environmental and political framework within which Ontario Hydro's planning is to take place (page 53).

5. Ontario Hydro should use its end-use model as the primary tool for forecasting future demand for electricity. Additional resources must be assigned to the task of acquiring the necessary data to make the end-use model operational as soon as possible (page 56).

6. As the basis of its planning exercise, Ontario Hydro should develop a range of plausible scenarios based on end-uses. Alternative resource mixes must then be evaluated over a range of plausible scenarios, rather than a single line, "most probable" forecast (page 56).

7. Prior to approval by the Board of Directors, a draft of Ontario Hydro's range of forecasts should be made available to the public and distributed widely to experts and interested parties. The external committee for reviewing the draft forecasts should become a formal requirement of Ontario Hydro's planning process (page 57).

8. Prior to final approval of the forecast by the Ontario Hydro Board of Directors, the Ministry of Energy should be required to publish, in addition to its own forecast range, a formal response to Ontario Hydro's draft forecast range (page 57).

9. Ontario Hydro must develop a comprehensive conservation strategy employing a wide range of programs to ensure that the benefits of conservation resources are distributed widely throughout the province. In its assessment of individual conservation options, Ontario Hydro must be explicitly prohibited from using the "no-losers" test as a screening tool (page 60).

10. The Government should direct Ontario Hydro to initiate, as part of its resource plan, three large scale technical and market demonstration programs for conservation, up to $25 million each, in each sector (residential, commercial and industrial) (page 61).

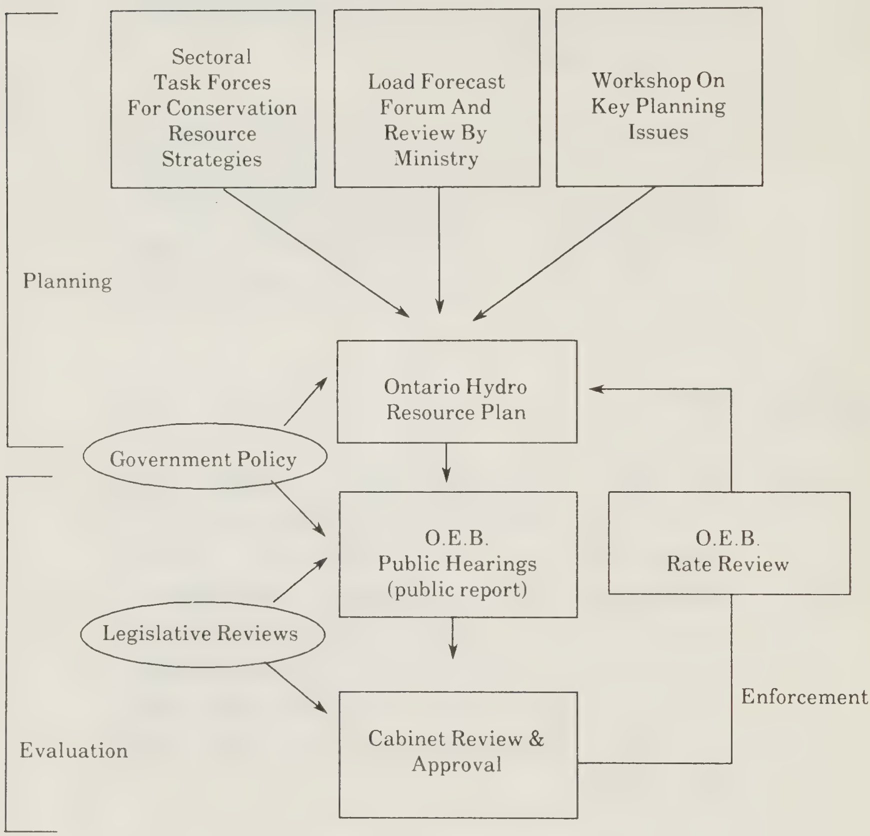
Government Activities:

11. The Ministry of Energy should investigate the feasibility and desirability of provincial action in the development and implementation of labelling programs and efficiency standards to encourage the production and use of high efficiency appliances. The Ministry should also develop a plan to encourage the construction of more efficient buildings using incentives and/or strengthening the existing building code (page 63).

12. The Power Corporation Act should be amended to allow Ontario Hydro to engage in the full range of options for promoting conservation (page 64).

13. The Minister of Energy should request the Ontario Energy Board to hold a public hearing to determine the price which best reflects the value of parallel generation to the system, and to determine the desirable amount of parallel generation that could be added to the system within the current planning horizon (page 65).

PROPOSED PLANNING & DECISION-MAKING PROCESS



14. The Ministry of Energy should develop and publish detailed plans for parallel generation options including:

    - Specific targets
    - Financial and contractual arrangements
    - The role of Ontario Hydro in promoting parallel generation
    - Additional research, development and demonstration programs needed
    - Information and marketing efforts.

    The Government must direct Ontario Hydro to incorporate these plans into its own annual resource plans (page 66).

15. The major firm purchase option should not be pursued at this time. It should be re-evaluated once cost-effective indigenous resources, such as conservation and cogeneration, have been utilized (page 67).

The Decision-making Process:

16. The Ontario Energy Board should be empowered to hold bi-annual public reviews of Ontario Hydro's Resource Development Plan, and publish a public report with recommendations to Cabinet (page 69).

17. The Ontario Energy Board should conduct a public review of the results of Ontario Hydro's demand and supply options study. This review should take place at least sixty days after a final report on the options and all supporting documents have been issued. Recommendations should be made to Cabinet in a public report (page 69).

18. Ontario Hydro's draft resource development plan and supporting documents should be published sixty days in advance of the hearings in a form determined by the Ontario Energy Board (page 70).

19. Ontario Hydro should publish, for review by the Ministry of Energy, a detailed evaluation of all strategic marketing programs including goals, objectives, costs, and benefits (page 72).

20. Ontario Hydro should produce, as part of its resource development plan, a scenario where environmental protection would be the top priority. This scenario should identify differences in options and cost from the recommended strategy (page 73).

21. As the Memorandum of Understanding is an important mechanism for maintaining Ontario Hydro's accountability, it should become a formal legislative requirement (page 74).

22. The Ontario Energy Board Act should be amended to give the Board the powers to regulate electricity rates (page 75).

Public Involvement:

23. Ontario Hydro should conduct open planning workshops to facilitate full and open discussion of planning issues prior to the finalization and publication of a draft resource plan (page 78).

24. The Government should resolve the issue of intervenor funding (page 80).

25. Ontario Hydro should establish a special Task Force for each of the residential, commercial and industrial sectors for the explicit purpose of participating in the development and on-going monitoring of a conservation strategy for that sector (page 81).

The Select Committee's Future:

26. The term of the Select Committee on Energy should be extended to allow it to review two specific items (page 83):

    1. The establishment of a Consumer Advocate as a method of improving the representation of the interests of the general public in hearings related to electric power planning issues.

    2. The role of Municipal Utilities in facilitating demand-side activities.

CHAPTER I

DARLINGTON SHOULD PROCEED DESPITE NEED FOR A MORE BALANCED SYSTEM

After periods dominated by the development of hydraulic, coal and then nuclear generating capacity, Ontario is entering a new phase of electric power planning which is characterized by unusually high uncertainty and risk. Ontario Hydro must increase the flexibility of the electric power system to reduce uncertainty and to manage risk. It must establish a better balance between demand and supply options in the system and to diversify the types of resource options chosen.

These trends lead us away from the nuclear generation option. Its benefits are declining while the risks associated with it have increased. At the same time we have, in Ontario, a huge nuclear plant - Darlington - which is two-thirds complete. And, because of Ontario Hydro's lack of experience with new planning techniques and its lack of understanding of conservation, we find ourselves in no position to replace it. Too little is known about the cost and timing of conservation to risk thousands of jobs and billions of dollars of investment. And, because the incremental costs of completing Darlington are so low, there are no comparable supply alternatives.

This chapter reviews the evolution of Ontario's electric power planning to today's environment of high risk and uncertainty and outlines why Ontario's lowest risk option in the short term is to proceed with Darlington.

RISK & UNCERTAINTY CHARACTERIZE NEW PHASE OF ELECTRIC POWER PLANNING

To date there have been three phases of electric power planning in Ontario. At the beginning of the century, when the Hydro Electric Power Commission was formed, the rallying cry was "Gifts of Nature for the

People". The "gifts" were the hydroelectric power sites located across the province. Water power, coupled with long distance transmission, were the essential ingredients in establishing the concept of a central supplier of power. Hydroelectric power was expensive at first, but as the debt was paid down and the demand grew, the real price of electricity fell. Ontario Hydro continued to expand its hydroelectric generating system to meet the load throughout the first half of this century. During this period virtually all the generating capacity in the province was powered by falling water. Hydroelectric power still meets almost a third of Ontario's needs at an average cost of 0.7¢/kWh.

The second phase of development in Ontario - coal-fired generation - began when the first coal-fired plants (Keith and Hearn) were built in the early 1950's, to meet the post-war surge in demand. Additional coal-fired capacity was installed at Lambton, Thunder Bay and Lakeview as demand remained strong through the 1960s. The coal-fired phase of development came to a close in Ontario with the construction of one of the world's largest power stations, the 4000 MW Nanticoke Station on Lake Erie.

The third phase, the development of CANDU nuclear power, overlapped the coal phase. Growth in demand was so strong in the 60s and early 70s that meeting the increased load with coal-fired generation would have resulted in serious environmental pollution and a huge outflow of money to pay for American coal.

Ontario has pursued the nuclear option aggressively. By 1987, 34% (10426 MW) of our generating capacity will be nuclear. If the current construction program is completed, 43% (13950 MW) of our capacity will be nuclear by 1992. Nuclear generating facilities represent a major area of investment for the province - outstripping capital investment in automotive, steelmaking and other major sectors between 1977 and 1984.[2]

Up until the mid-1970s, and during the nuclear era, power system planning was relatively straightforward - its purpose was simply to ensure there was enough power to meet demand and support economic growth. For decades prior to 1973, electricity demand was closely linked with economic

2. See Note 2.

growth. Both were very predictable. Demand had been growing steadily at 7% per year for decades. However, the OPEC crises of the 1970s altered the relationship between these two variables, resulting in lower electricity intensity in Ontario. And, by the early 1980s demand growth had dropped off considerably. The focus of system planning has now shifted to slowing down the construction schedule and improving capacity utilization as Ontario Hydro has built up a healthy surplus of generating capacity that will carry us through to the mid-1990s.

Now there is conflicting evidence about the direction and magnitude of changes in demand. On the one hand, there is significant evidence to suggest that lower electricity intensity is here to stay. The effects of the OPEC crises are working their way through the system. In general, people tend to be more conservation conscious. A decade of rapid advancement in energy-efficient technology is available, some of which is in place in our buildings and equipment stock. Businesses are learning more about managing energy costs. And, an increasing share of our economy's growth is coming from the service sector which is less electricity-intensive than the resource or manufacturing sectors.

On the other hand, demand for electricity has been stimulated by continued developments in electrotechnologies, as our manufacturing industries become increasingly mechanized. Our increasingly-affluent life-style also demands more appliances and electricity-using devices. Growth in electricity demand has also been supported, in general, by the Ontario Government's policies and initiatives designed to reduce our dependence on imported oil. The off-oil initiatives, however, will be set back somewhat by the current glut in oil supplies.

At this time, demand for electricity is being fuelled by a rapidly expanding economy. However, the 1974/75 and 1982/83 recessions reduced demand significantly. Although the boom and bust cycle has been a characteristic of our economy as long as Hydro has been in existence, electricity consumption is more difficult to predict now, because the swings are more prounounced and the relationship between economic growth and load growth is changing.

Ontario Hydro reflects the uncertainty of demand in its official forecast which is published as a range - a "most probable" forecast is bounded by "high" and "low" forecasts which vary by more than 13000 MW in the year 2000 - over fifteen 850 MW units!

Aside from an unstable load growth, fluctuating fuel prices, unpredictable customer behaviour and rapid changes in alternative supply technologies add to the uncertainty of the planning environment.

A DIVERSIFIED RESOURCE MIX REDUCES RISK

As the uncertainty associated with planning an electric power system has increased so has the risk involved. While demand has fluctuated widely, the lead times and costs of generating plants have increased. This section describes new planning approaches that have emerged to deal with risk and uncertainty. These new planning approaches have been calling for more demand-side options and operator supply-side diversity to balance electricity systems. Conservation resources are flexible options that can help reduce uncertainty. And there is a wide variety of alternative supply resources available. Because of the availability and attractiveness of these options, the need and desirability of additional commitments to nuclear energy are in question.

1. New planning approaches have emerged. The high level of uncertainty brings with it a higher degree of risk. Utility planners have conceded that old forecasting and planning tools are not reliable enough to support decisions about multi-billion dollar investments with lead times of a decade or more.[3]

3. See Ralph Cavanagh, (April 1, N-33, p.6) and John Robinson (April 4, N-39, p. 12-24).

Since the late 1970s, new planning concepts and approaches have emerged. Utilities are seeking to manage the planning risk by reducing their capital outlays and increasing the flexibility of their resource portfolio.

> "The basic strategy is to minimize capital outlay and to come up with a resource mix that has the best present value for both the utility and the ratepayers. In essence, this is what the utility industry in the U.S. is evolving towards."[4]

There has been growing support among Canadian and American utilities and regulators for the concept of a "least-cost energy strategy."

The least cost planning concept deals with planning uncertainties in two ways. First, the utility learns to influence demand to reduce uncertainty - it no longer accepts uncertainty as a disabling fact of life. A wide variety of demand-side programs are being deployed including information programs, demonstration projects, technical assistance programs and incentives and grant programs. The range of utility programs is described in Appendix E.

Second, to deal with what uncertainties remain, utilities are diversifying their resource mix by pursuing a variety of smaller scale supply options that are more flexible.

Use of the term "least-cost" implies the provision of energy services at the lowest possible cost to society. A least cost energy resource is that next additional resource of energy supply or energy reduction which can provide the required energy service for the least total cost. Although total cost often means just economic costs, it can be defined to include non-economic or social costs.

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4. Todd Davis (N-40, p. 9).

The success of a least-cost planning approach depends on the utility considering demand and supply options equally in the planning process. The utility chooses from a wide range of alternatives to build a balanced resource mix that meets the needs of the planning environment.

In order to build a balanced system with a truly integrated planning process, a great deal of progress has yet to be made on evaluating and utilizing demand-side resources, particularly conservation options. Demand-side programs are not a new concept to Ontario Hydro. What is new is the vigour with which utilities are pursuing conservation and the strategic manner in which they are being deployed. Ontario Hydro has recently acquired sophisticated computer models with which to analyze and evaluate demand-side options. But, these analytic tools are exceptionally data intensive and require several years of research and experimentation to make them fully operational.

Diversifying Ontario's resource base is a priority of the current government.[5] The diversity is critical for the flexibility and reliability of our system. The more dependent we get on any one technology, the more risk we incur. By pursuing a balanced mix of various demand and supply options - cogeneration, alternative and renewable resources, hydraulic and a variety of demand reduction and control measures - we can increase our system's flexibility.

2. Conservation resources are flexible and reduce uncertainty. From a planning perspective, electricity must be viewed as only one of a multiplicity of options to meet the demand for energy services.[6] Growth in demand for energy services can be met either by generating more electricity or acquiring energy savings.

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5. See the Throne Speech, April 14, 1986.
6. See Note 3 for a description of the term energy services

EXHIBIT I.1

BENEFITS OF CONSERVATION

1. Increases reliability → system becomes more diverse

2. Increases flexibility
   - easier to add → shorter lead times
   - easier to turn off → small increments

3. Reduces uncertainty → consumption levels are being controlled

4. Improves standard of living → lower energy costs, more disposable income

5. Improves industrial competitiveness → lower energy costs

6. Reduces/prevents pollution → defers supply options

> "The first and most critical least-cost planning insight was that improvements in end-use efficiencies can be converted into an energy resource, a supply option, if these improvements can be achieved in substantial quantities on a predictable schedule managed by the utility system. In the United States, we have spent the last eight years learning how to do that."[7]

Conservation, as a resource option, has significant advantages for the Province and deserves fair consideration as Ontario Hydro strives to satisfy the need for electricity services. The key advantages of conservation are summarized in Exhibit I.1.

The first advantage of conservation programs is that they act directly to reduce the uncertainties about future consumption. If the electricity needs of houses, appliances, commercial buildings and industrial processes can be reduced, then the significance of economic fluctuations is diminished. Errors in predicting the number of houses or appliances will have less significance in terms of the system's annual electricity consumption.

The second major advantage of conservation, from a planning perspective, is that it is flexible for dealing with the uncertainty that remains. Conservation programs can be developed in small units and they have short lead times. They are not packaged in large, indivisible 850 MW units and they can come on line in months or years, as opposed to 15 years or more.

Once a program has been developed and tested it can create savings relatively quickly, and these savings can be timed to match growing power needs. Conversely, once a program has been started, it can be maintained at a minimum level or stopped if it is not needed. While conservation programs are capital intensive, they can be paced to deliver the needed amount of savings much more easily than new central station power plants.

By intervening on the conservation side, utilities can take an active hand in shaping how much conservation comes in and the rate of its penetration. As a result, the utility can begin to reduce uncertainty.

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7. Ralph Cavanagh, (April 1, N-33, p.6).

Conservation reduces uncertainty and it benefits our environment by delaying generating plants. And, saving energy should lower energy costs which would improve our standard of living and make our industries more competitive. But acquiring energy savings costs money and all conservation is not cheap - at least not necessarily cheaper than major supply options. How much of a premium do we want to pay for the environmental benefits of conservation? The entire debate about the desirability of conservation then centres on this single issue: how much conservation is available at the price of our best supply option? and when can we get it?

Ontario Hydro estimates the potential of strategic conservation by the year 2000 to be between 1000 and 4000 MW, depending on how actively the resources are pursued. Witnesses appearing before the Committee estimate the potential for conservation to be as high as 10000 MW by the year 2000.[8] Their programs were estimated to cost $6-7 billion.

In reality, Ontario Hydro planners do not have the experience with conservation, nor do they have the necessary information base to estimate with certainty the costs and benefits of conservation programs. Therefore, they look upon demand-side options as increasing planning uncertainty because these options are unpredictable, being so diverse and relying on consumer behaviour. Supply-side options, on the other hand, are considered to be within the planners' control because they can be engineered and implemented by the utility, and there is a tremendous wealth of experience with their deployment.

However, the uncertainty surrounding demand-side options can be reduced. As the experience of U.S. utilities has shown, the rapidity and depth of take-up can be controlled. The development of detailed end-use data

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8. See the presentation of J. Robinson, R. Torrie and C. Figuieredo (April 9, N-41).

EXHIBIT I.2

PARALLEL GENERATION

	Potential By 2000 (peak MW)	Cost (¢/kWh)	Environmental Considerations	Flexibility	Helps Diversity	Security & Reliability	Employment
Cogeneration	1,000	3.3-5.3	Fair	Good	Good	Fair	Fair
Small Hydro	500	2.7-6.2	Fair	Good	Good	Fair	Fair
Municipal Solid Waste	300	3.1-6.9	Good	Good	Good	Good	Good

GENERAL ADVANTAGES:

- Competitive cost
- Reliable
- Short lead time
- Small increments
- Located at, or near, source
- Defers commitment to long lead time supply options

banks and the application of well-known, sophisticated marketing research techniques can help a utility understand consumer behaviour. The uncertainty surrounding the implementation of demand-side options can be largely eliminated by the use of demonstration projects and pilot tests.

Experience in the U.S. indicates that while uncertainty will always remain, data gathering, and direct program experience can narrow the utility's range of uncertainty significantly.

Governments and utilities across the U.S. have made strong commitments to demand-side measures. California, Nevada and the Northwest region all have sophisticated processes for evaluating demand-side options and developing utility plans based on least-cost principles. The U.S. Department of Energy, and states like Michigan and Texas are committing large financial resources to study and/or implement least-cost planning processes.

Witnesses often referred to the experience with demand management in California and the Northwest. Both have discovered that they have more conservation resources than they need and that there are no major supply options being considered in the current planning horizon. However, information on conservation potential or resource strategies in other regions is not necessarily applicable to Ontario There can be vast differences in economic structure, energy prices, construction costs and end-uses. These regions, for example, have very high costs of new plant construction. They can afford to purchase more conservation as their marginal cost of supply can be as much as twice that in Ontario.

<u>3. A large number of diverse supply options are available</u>. A number of cost-effective supply options that provide flexiblity and diversity are available including parallel generation, hydraulic and firm power purchases.

Parallel Generation

There is general recognition that parallel generation options are desirable for Ontario. Profiles of cogneration, small hydro and municipal solid waste appear in Exhibit I.2.

Only 5% (1100 MW) of Ontario's power is generated by private sources. This capacity is divided equally between private hydroelectric and industrial cogeneration.

500 MW of additional small hydro capacity (<20 MW) could be developed at existing dams and several hundred megawatts could be developed at sites without dams. The Ontario Government is promoting the private development of small hydro at existing dams and a target of 100 MW of new small hydro by 1995 has been set.

Cogeneration resources are more abundant than small hydro. The Ministry of Energy has estimated that there is 5000 MW of technical potential for additional industrial cogeneration. Up to 1000 MW could be brought into service by 2000 if the capacity were needed and if incentives were offered. Left to market conditions, the Ministry estimates that 300 MW of cogeneration will be installed.

Present cogeneration capacity is partly fueled with waste wood at pulp and paper plants and partly by natural gas at other industries. The majority of new cogeneration would likely be fuelled by natural gas or oil. Cogeneration capacity is inexpensive to install and the fuel is used very efficiently since both useful heat and electricity are produced. This is a flexible option with short lead times and it likely would be acceptable to the public.

Wind and photovoltaics have almost unlimited potential, and are extremely attractive for diversity and environmental reasons. However, other than special applications remote from the central grid, the are uneconomic.

Energy from municipal solid waste has the potential to supply 300 megawatts by 2000. This technology does not score as high as other forms of private generation on the key criteria of flexibility and public acceptability. Its major advantage is that it reduces the need for landfill sites. Ontario Hydro estimates that 60 MW of this source will be installed by 2000.

In total, Ontario Hydro estimates that, without incentives, 460 MW of parallel generation will be contributing to the system. However, with clear

EXHIBIT I.3

FIRM POWER PURCHASE

PROS	CONS
- Indigenous to Canada	- Not indigenous to Ontario
- Increases Ontario's diversity	- Limited flexibiilty
- Environmental impact limited to transmission	- No control over schedule
- Transmission capacity valuable after contracts	- Most jobs outside Ontario
- Competitive cost	- Limited "window of opportunity" for delivery by 2000

government direction and with appropriate programs, there is an opportunity to add over 1400 MW to the system.

Hydraulic

Ontario Hydro operates 68 hydraulic generating stations, with a total dependable January peak output of about 6400 MW. These stations produced about a third of Hydro's electrical production.

The most attractive hydraulic sites have already been developed, but there is estimated to be a potential for further 9300 MW of installed capacity. Of this, 1085 MW of capacity are not available for development, because the sites are in areas designated by the Ministry of Natural Resources as waterway parks. A further 3330 MW of capacity are associated with sites on remote northern rivers. These sites are remote from the load centres and would entail very high transmission costs. Their development would also involve significant environmental problems. This leaves 4900 MW of realizable potential.

Of this potential, Ontario Hydro is studying the 17 most favourable sites, which could have a peak output of about 2700 MW.

Ontario Hydro is conducting detailed studies of three sites: Little Jackfish (129 MW), Matagami River extension (398 MW) and redevelopment of the Niagara River (360 MW extra) totalling close to 900 MW.

Firm Power Purchase

Major power purchases of up to 4000 MW are available to Ontario by the year 2000. However, a power purchase is a mixed blessing as the list of pros and cons in Exhibit I.3 shows.

The main advantages of a purchase agreement are that it would increase the diversity of our resource base and lessen financial risks by delaying the need for another generating station. However, purchases would not be a flexible option, costs would not be improved and Ontario jobs would be exported.

EXHIBIT I.4

FIRM POWER PURCHASE

	Amount (MW)	New Capacity Needed?	Transmission Requirements (Total)	Capital Cost For Transmission Line Improvements (Millions)
Manitoba	200	No	Minor interconnection	n/a
	500	Yes	1,000-1,500 km	$1,041
	1,500	Yes	1,000-1,500 km	$1,041
Quebec	750	No	Minor interconnection	n/a
	2,000-4,000	Yes	730-1,330 km	$600-$1,450

The above numbers do not include any investment in Quebec's facilities.

Larger scale purchases with either Manitoba or Quebec would require construction of additional generating capacity and major transmission line improvements (Exhibit I.4). Larger potential and the lower transmission line costs make a Quebec purchase agreement more attractive. The earliest delivery date for a major purchase agreement would be in the late 1990s, provided an agreement was signed within the very near future.

4. The need and desirability of nuclear is in question. The choice to construct a nuclear generating station is a societal and political judgement that the benefits accrued from a nuclear reactor will exceed the risks incurred.

In retrospect, the development of the CANDU was visionary - Canadian technology and uranium to produce an unlimited supply of low cost, reliable power. The nuclear plants reduced the environmental problems caused by burning coal and their construction provided tremendous economic benefits in direct and indirect employment. As a source of inexpensive, reliable power, the CANDU was the best option available for Ontario Hydro in the 60s and 70s, to meet the rapid growth in demand predicted.

A significant cost feature of nuclear plants is their economies of scale. Both capital and operating costs decline per installed megawatt of electricity produced as you move from single unit, small stations to multi-unit, large stations. The four-unit stations with large reactors utilize engineering, supply, construction and project management services more economically. Operation, maintenance and administration costs also decline per installed megawatt for the four-unit stations. Standard costs range from a low of 3.2¢/kWh to 3.6¢/kWh for the four unit stations with reactor sizes of 540 MW to 1250 MW, to a high of 5.0¢/kWh for the single unit, 600 MW option, and 6.7¢/kWh for the single unit, 300 MW option.

The CANDU involves very large initial capital outlays - Darlington will cost an estimated $10.9 billion. However, these plants have very low operating costs and 30-40 year life expectancies. Therefore, nuclear plants are most cost effective when they are run all year long as base-load resources. And Ontario Hydro has had an excellent track record in doing just that - running them all year long.

EXHIBIT I.5

THE NUCLEAR OPTION

Benefits

- Low cost, reliable base load option
- Employment and economic spin-offs
- Best for meeting high load scenario
- Can replace more expensive fossil-fuelled options

Risks

- Ontario's requirements not enough to sustain CANDU
- Aggressive DSM could delay need well past current planning horizon
- Export markets for surplus uncertain (can't compete over the long term with Manitoba or Quebec)
- Inflexible (large increments, long lead times)
- Over-reliance on new technology
- No solution for disposal of irradiated fuel
- Approval process highly uncertain

Ontario Hydro operates five of the top ten reactors in the world, rated on the basis of lifetime capacity factor. (Capacity factor is a measure of the reactor's performance; its actual operating time expressed as a percentage of its total potential production time). Ontario Hydro's CANDU nuclear plants are successful because of good design and operation, and a unique feature which permits refuelling without stopping or slowing the reactor process.

A major risk with the nuclear option is its safety. This was the subject of a review by a previous Select Committee. The Committee's conclusion reflects the political judgement which prevailed throughout the construction of nuclear plants in the 1970s and early 1980s.

> ". . . given the clear commitment of Ontario Hydro and AECL to safety, the past safety record of the existing reactors and the design mechanisms to limit the consequences of possible accidents, the Committee found that the chance of a very serious accident occurring in any single reactor is extremely small and, on the basis of the information considered to date, that the reactors are, therefore, acceptably safe."[9]

In the minds of the Legislators, the benefits from nuclear energy outweighed the risks incurred. However, the last nuclear plant was approved for construction ten years ago and, from a public policy perspective, the benefits are decreasing and the risks are increasing. Exhibit I.5 summarizes the key benefits and risks.

Gone are the days of five to seven percent annual growth in electricity demand which was the driving force behind the CANDU's development. Although demand growth is highly uncertain, the range (1.1-4.0%) is far below the growth levels that led us to aggressively develop nuclear energy. Many new viable demand and supply options have emerged in response to high uncertainty. Governments and utilities throughout North America have learned, often through necessity, that demand can be controlled and uncertainty reduced through innovative and aggressive

9. See The Safety of Ontario's Nuclear Reactors, Final Report, Select Committee on Ontario Hydro Affairs, June, 1980.p. 2.

strategic conservation initiatives. Ontario also has a number of smaller, competitively-priced supply options which it could acquire to diversify its resource base in electricity, contributing further to the system's flexiblity.

Because of their lead times and their unit size, nuclear reactors are not well-suited for dealing with the uncertainty we face in our planning environment. The lead time for a CANDU reactor is the longest of all options. It would take a minimum of 14 years for approvals, design and construction to be completed for the first unit of a multi-unit station. The final unit would not be in service for 17 to 20 years from conception. Also, there is a lot of uncertainty surrounding the approval process, for the Environmental Assessment Act has not yet been applied to a major generating station.

Such long lead times limit the flexibility of the nuclear option to accommodate unforeseen changes in demand. Smaller unit sizes would afford greater flexibility, but, they are much more expensive. Greater flexibility could be achieved at a modest increase in cost if a large multi-unit station were committed for construction one or two units at a time. Ontario Hydro may be able to shorten the time between financial commitment and in-service date by modifying their construction methods, but no such methods have been revealed.

In the United States, the Northwest Power Planning Council has instituted an "options" approach. After advance design, licensing and approvals are completed, the supply option is put on hold, ready to proceed with construction when demand levels warrant it.[10]

If demand grows slower than expected, nuclear energy could replace more expensive fossil-fuelled generation, improve energy security and reduce acid gas emissions. But, these functions can also be supplied, at least in the current planning horizon, by other demand and supply options.

As demand declined in the late 1970s and through the 1980s, Ontario stretched its nuclear construction program and exported some of the

10. See Note 4.

remaining surplus for profit to neighbouring states. In total, $427 million in revenue was received from exports in 1984 alone - the profits from this revenue benefitted the ratepayers directly. Selling surplus power is desirable, but export markets may not always be available. The level of demand is uncertain as neighbouring states, Michigan and New York for example, embark on major "least-cost" planning initiatives and aggressively pursue conservation resources. Even if demand should materialize, it will be difficult to compete with the large hydroelectric resources of our neighbouring provinces.

In addition to the long lead time, the size of CANDU's reactors also decrease its flexibility. Additional capacity can only be added in large increments. And, when a single unit is down for repair or maintenance, a chunk of 750 to 850 MW of capacity is off the system. At Pickering, two units (1030 MW) have been shut down for three years for repairs after a reactor tube ruptured. This shutdown is estimated to cost the ratepayers as much as $1 billion.[11] In late March, 1986 a second tube accident has occurred, this time at the Bruce Nuclear Generating Station. It is not known how long the damaged unit will be out of service.

The accidents at Ontario's nuclear reactors highlight a serious concern - the dangers of over-reliance on one technology. If the reactor tube problems were to continue, or a flaw in the design was discovered, 30-40% of our system would be affected. The greater the commitment to any single technology, the greater the planning risk.

Nuclear energy also has the disadvantage, common to all large centralized generating stations, of greater transmission requirements to carry the electricity from the source to the end-use.

At the heart of the public debate about the desirability of nuclear energy are concerns over environmental impacts and safety. The public is concerned about radioactivity, including the negative effects of uranium mining and disposal of spent fuels. Irradiated fuel is currently stored in underwater fuel bays at the plant site. While this is a safe and inexpensive

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11. "Deadly Rector Fuel Rods Missing in Hydro Reactor", Toronto Star, Thurs., Apr. 3, 1986.

EXHIBIT I.6

OVERVIEW OF THE OPTIONS

	Potential By 2000 (peak MW)	Cost (¢/kWh)	Acid Gas Reduction	Flexibility	Helps Diversity	Security & Reliability	Employment
Nuclear	3,400	3.2-5.0	Good	Poor	Poor	Good	Good
Conservation	4,000	2.4-4.8	Good	Good	Good	Good	Good
Large Hydro	2,700	3.7-5.5	Good	Good	Fair	Good	Good
Small Hydro	500	2.7-6.2	Good	Good	Good	Fair	Fair
Cogeneration	1,000	3.3-5.3	Fair	Good	Good	Fair	Fair
Purchases	4,000	3.2-?	Good	Poor	Good	Fair	Poor
Oil & Gas	2,500	4.2-5.8	Good	Good	Fair	Good	Fair
Coal	4,000	4.0-6.5	Poor	Fair	Poor	Good	Fair

method of storage, it is not sufficient for the long-term. Plans are underway to develop long-term waste disposal sites - one option being studied is storage bays deep in the Canadian Shield - but, at this time no such disposal sites exist.

The attractiveness of nuclear, relative to all other major options, is shown in Exhibit I.6.

HOWEVER, DARLINGTON IS THE LOWEST RISK OPTION IN THE SHORT TERM

The desirability of nuclear energy has decreased as planning uncertainty grows and as other more attractive resource options show potential. However, before we decide on options for the year 2000, we need to deal with the Darlington Nuclear Generating Station which is two-thirds completed. There are differences in lead time, incremental cost and employment impact between Darlington and a long-term nuclear option. Therefore, Darlington must be evaluated as a separate and unique decision.

When Darlington was planned by Ontario Hydro some ten years ago, it was justified primarily as an efficient way to meet the growing demand for electricity - a demand which had been growing at about 7% per year for decades. In fact, in 1977, Ontario Hydro was given approval to proceed with the station without a formal environmental hearing because of the perceived urgency of meeting these needs in the mid-1980s. Since that time, the station's construction was slowed down as the load forecast changed indicating a diminishing growth in the demand for electricity. Later, Darlington was accelerated as part of a government strategy to stimulate the economy. A key question facing this Committee was to determine whether the station was still needed. Although $7.1 billion has been committed to the project (as of September 1985), there is up to $3.76 billion that would not be spent on Darlington if the plant is not built.

In the fall of 1985, the Committee examined the need for Darlington from three perspectives - whether the electric system needs the additional generating capacity; whether the plant is needed to reduce acid gas

EXHIBIT 1.7

	1985/86	1992/93	1995/96	1999/2000
Committed Generation Capacity				
Hydraulic	6,500	6,500	6,500	6,500
Nuclear (including Darlington Units 1 & 2)	8,858	12,188	12,188	12,188
Fossil				
- Coal	10,169	10,169	10,169	9,322
- Natural gas	588	588	588	0
- Oil (steam)	2,232	2,232	2,232	2,232
- Oil (CTUs)	418	418	418	418
	13,407	13,407	13,407	11,972
Total	28,765	32,095	32,095	30,660
Demand Scenarios				
High (4.0%)	-	31,800	35,750	41,800
Most probable (2.5%)	24,150	28,700	30,900	34,100
Low (1.1%)	-	26,100	27,000	28,150
Alternative Options				
Darlington Units 3 & 4		1,762	1,762	1,762
Parallel Generation:				
- Cogeneration			300-600	1,000
- MSW			100-200	300
- Small Hydro			0	100
Hydraulic			0	2,700
Purchases				
Manitoba			200	1,500
Quebec			750	4,000
Strategic conservation			?	4,000+

emissions; and, whether it is needed to minimize the overall cost of electricity to the province's consumers.

The Committee's findings were outlined in an interim report on Darlington, tabled in the Legislature in early December. Its main findings were:

¶ All units of Darlington were not needed to meet demand until the turn of the century. The Committee determined that if the province could avoid constructing Darlington, if it wanted to. There are enough alternatives to be able to meet the high growth scenario to the year 2000 (Exhibit I.7). Deferring the need for Darlington would depend on three key assumptions:

- A major purchase agreement is signed

- A further decline in electricity intensity is achieved (permanent efficiency gains are made)

- Modest increments of parallel generation are installed

¶ As well, Darlington is not needed to meet acid gas emission standards. But, the alternatives that are available to meet new, restrictive provincial standards would cost significnatly more. Coal scrubbers are estimated to cost over $4 billion

¶ However, the cost advantage of Darlington exists within a wide range of financial and demand variables. The feasibility of cancelling the last two units of Darlington appeared within the realm of possibility, but was determined to be unlikely.

At the conclusion of the fall hearings in Darlington, the Committee remained unsatisfied with Ontario Hydro's review of alternatives to Darlington. Ontario Hydro was unable to run detailed, sensitivity analyses on key economic variables for the Committee. And, Ontario Hydro did not appear to give serious attention to demand-side alternatives, particularly conservation and efficiency resources, in its review of Darlington.

EXHIBIT I.8

DARLINGTON PROJECT COST ESTIMATE

COMMITTED COSTS ($ Millions, Current $)				INCREMENTAL COSTS FOR EACH ALTERNATIVE		
	$ Spent	Unavoidable Commitments	Total Committed	Cancel All	Complete 1,2	Complete All
Design and Construction:						
. Engineering	400	30	430	10	140	180
. Permanent materials:						
.0, 1, 2,	980	180	1,160	0	90	180
.3, 4	130	320	450	0	0	350
. Total	1,110	500	1,610	0	90	530
construction	560	40	600	80	460	910
Total Design & Construction	2,070	570	2,640	90	690	1,620
Operations:						
. Commissioning	20	0	20	0	150	170
. Training	35	0	35	0	85	155
. Heavy water	880	0	880	0	350	870
. Fuel	0	0	0	0	30	70
Total Operations	935	0	935	0	615	1,265
Interest Charges	655	2,815	3,325	0	500	965
Total	3,660	3,385	7,045	90	1,805	3,850
Total Committed				7,045	7,045	7,045
Total Per Alternative				7,135	8,850	10,895

Incremental Cost	$ Billions
All 4 units	3.850
Units 1 & 2 only	1.805
Incremental cost for 3 & 4	2.045

Given the advanced stage of construction of Units 1 and 2 (80% complete), the Committee decided that they could not be cancelled on economic grounds and recommended they be continued as scheduled. However, the viability of Units 3 and 4, which were less than 50% complete at the time, remained in question. The Committee recommended that major contracts be held on these units while demand and supply options were reviewed in more detail.

The Committee's examination of Darlington as a resource option, has focused primarily on planning risk and economic impact. The Committee has concluded that, completing Darlington is the lowest risk option for Ontario for the following reasons:

¶ There are no comparably-priced resources which can be acquired with any degree of certainty

¶ It provides security for meeting the high load growth scenario through the mid-1990s

¶ If it is not needed immediately, it can be used to retire older, more expensive plants earlier than planned (Keith and Hearn)

¶ It is the cheapest alternative to fight acid gas emissions

¶ Cancellation of the units would result in an unnecessary rate shock

¶ Cancellation would result in the immediate displacement of several thousand jobs.

In our interim report, we determined that approximately $2.045 billion could be saved if Units 3 and 4 were cancelled (Exhibit I.8). To benefit the ratepayer, we would have to be able to purchase a similar amount of power (1762 MW), within a similar time frame (likely two to three years extra time considering the surplus) and for a better price - the incremental cost of Darlington is likely to be close to 1.5 cents/kWh.

The only resource options which would have a chance of meeting these criteria are conservation programs. However, the Committee has learned that Ontario Hydro has not considered strategic conservation as an alternative to Darlington because it doesn't have sufficient information. It appears that there is enough potential available - Hydro estimates 4000 MW by 2000, other witnesses estimate as high as 10000 MW. Even though these are guesses, the potential appears to be high. The problem is: how fast can the potential be acquired and at what cost? Ontario Hydro has little information in this area. It currently has no programs for acquiring conservation resources through strategic initiatives. As a result, they have very limited market data and little understanding of conservation programs, their success and their limitations. To Ontario Hydro, to depend on conservation resources would involve a significant amount of risk at this stage.

Unfortunately, the information and experience on conservation from other jurisdictions is not easily transferred to Ontario considering differences in geography, economic structure, delivery mechanisms, and other social and political variables.

Energy experts outside Ontario Hydro have initiated work on electricity usage and conservation potential, but they have not had anywhere near the resources nor the time to assess conservation resources in a manner rigourous enough to build reliable programs or provide adequate justification for cancelling a multi-billion dollar project.

Recommendation 1:

> **Because of Darlington's low incremental cost and the uncertainties associated with other short-term options, all units of Darlington should proceed on schedule.**

The Province's choices regarding Darlington have been circumscribed. To ensure that our resource options are not restricted in the future, strong direction must be given to Ontario Hydro to build a capability in conservation and to develop a new approach to planning - one that will give demand-side options a fair chance and ensure that we progress toward a more balanced system in the future.

Given the imperatives of the current power planning environment and our increasing reliance on nuclear energy, it is clear that additional commitments to nuclear are undesirable at this time. Accordingly, the Committee recommends that

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Recommendation 2:

> **In view of the established potential of other supply options and the apparent potential for pursuing demand management initiatives, no further commitment should be made for additional nuclear power stations at this time.**

It is recognized that the formal mandate of the Select Committee on Energy did not specify that nuclear safety was to be a matter for review. Nonetheless, the recent reactor accident in the Soviet Union and Ontario's significant and growing dependence on nuclear power has invariably heightened public and political consciousness over the safety of Ontario Hydro's CANDU nuclear program. With the objective of ensuring that these reactors are designed to highest standards of safety it is recommended that:

Recommendation 3:

The Minister of Energy should appoint an independent panel of internationally-recognized experts to review, on a priority basis, the safety of the design, operating procedures and emergency plans associated with Ontario Hydro's CANDU nuclear generating plants. This panel should prepare a report to the Minister which should also be made available to the Members of the Legislature.

CHAPTER II

BARRIERS MAY INHIBIT BETTER DECISIONS IN THE LONGER TERM

Ontario Hydro was given clear direction to pursue conservation as early as ten years ago. But, as the province has faced a surplus in capacity, Ontario Hydro has had little incentive to respond to industry trends which encouraged greater demand-side activities. Once again, we are prevented from pursuing conservation - an option that is wisely recognized as having long run benefits for the province. We have too little information and experience with conservation to consider it as a responsible alternative to Darlington - a project whose biggest asset is its advanced stage of construction. Our choices have been circumscribed.

With Darlington coming on-stream, there is no urgent need for additional resources until the late 1990s. At some point the short-term goal of maximizing system utilization must give way to the long-term goals of system diversity and flexibility . Demand-side programs have lead times - they require research, design, demonstration, and implementation - if we don't do these activities, the conservation alternative will continue to look like a risky investment.

There are, however, a number of barriers which inhibit Ontario's progress toward a more balanced electricity system.

¶ Ontario Hydro's mandate is restrictive

¶ There is little evidence of a long-term commitment to conservation in Ontario Hydro

EXHIBIT II.1

OVERVIEW OF PAST REVIEWS

Reporting Year	Reviewing Body	Key Areas Of Recommendations
1972	Advisory Committee On Energy	. Energy outlook and policy implications . Impacts of energy use on the environment . Industrial energy demand . Uranium supply and demand
1972-73	Task Force Hydro	. Legal and institutional framework . Role of Ontario Hydro . Relationship with government . Public consultation . Corporate structure . Nuclear power . Financial policy and rates
1972-75	Solandt Commission	. Transmission Lines (Lennox to Oshawa)
1976-80	Select Committee On Ontario Hydro Affairs	. Bulk power rates and revenue needs . Forecasting and managing demand . Reliability . System expansion . Uranium contracts . Construction of heavy water plants . Need for electrical capacity . Safety of Ontario nuclear reactors . The management of nuclear fuel waste
1980	Royal Commission On Electric Power Planning	. Electric power requirements and conservation . Alternative energy sources . Nuclear power . Bulk power transmission . Land use and evironmental concerns . Decison making

¶ Ontario Hydro is conducting the most comprehensive review of options ever done in Ontario. This study represents an important step towards a new planning approach, but it has several major limitations. Ontario Hydro has a lot of progress to make before these new approaches are completely integrated within the planning process

¶ Conservation is undervalued by the marketplace. While the success of conservation measures depends on decisions made by individuals in the general marketplace, supply options are implemented by Ontario Hydro which has better borrowing rates and longer payback periods

¶ Our decision-making process is structured in such a manner as to allow key planning decisions to proceed past the point of no return before government has the opportunity for input. With a fragmented and uncoordinated decision-making process, there is little effective political control over the determination of our electrical future. Consequently, important public policy matters become matters of corporate strategy at Ontario Hydro.

This chapter reviews why Ontario Hydro has had little incentive to pursue conservation in the past and outlines the various barriers which may inhibit Ontario's progress towards a more balanced system.

ONTARIO HYDRO HAS HAD LITTLE INCENTIVE TO PURSUE CONSERVATION IN THE PAST

Ontario Hydro's planning approach and the decision-making process have been the subject of public reviews since 1972 (Exhibit II.1). Recommendations of these reviews that relate to demand and supply options and decision-making are reproduced in Appendix F. These reviews show that the long-term advantages of conservation have been recognized for over a decade. In 1976, the Select Committee on Hydro Affairs recommended that there be changes to the planning focus at Ontario Hydro. The Committee recommended that:

EXHIBIT II.2

ONTARIO HYDRO EXPENDITURES ON DEMAND-SIDE ACTIVITIES SINCE 1981

Energy Conservation and Efficiency (1981-present)	
Standards	$460,000
Research	6,100,000
Assistance	5,125,000
Awareness programs	3,870,000
TRIM	1,800,000
	$17,355,000
Energy Management (1981-present)	
Load management test	$14,000,000
Time-of-use test	4,700,000
Other research	550,00
Assistance/Awareness	1,950,000
Marketing programs	346,000
Cogeneration	1,500,000
	$23,046,000
Total (1981-present)	$40,401,000

Source: Ontario Hydro (Exhibit 73).

> "Ontario Hydro change its planning process to emphasize meeting Ontario's electrical energy needs after implementation of conservation and load management programs, with the minimum amount of new generation that is consistent to sound planning."[12]

The Select Committee review was followed by the extensive review of the Royal Commission on Electric Power Planning (RCEPP). Dozens of recommendations calling for a better balance between demand and supply options and supporting alternative generation were made by RCEPP. Its first recommendation is remarkably similar to the recommendation of the Select Committee quoted above:

> "Through the development of demand scenarios based on end-use data, future planning philosophy should be reoriented to emphasize demand management increasingly rather than maintain the focus on supply expansion, as is traditional."[13]

These reviews took place in the mid to late '70s. Since this time, Ontario Hydro has responded with various demand-side activities. In 1982, a new corporate mission statement was adopted which indicated a shift towards a greater focus on the customer . . .

> "Electricity is a valuable energy form in Ontario to be supplied by a prudent, lean, customer-oriented Hydro."

and, toward demand-side activities . . .

> "Promote customer's interests through programs for energy conservation and marketing surplus capacity."

Since 1981, approximately $40 million has been spent on various conservation and load management activities (Exhibit II.2). However, the primary focus of these efforts has been on load management programs. The

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12. Select Committee on Ontario Hydro Affairs, A New Public Policy Direction For Ontario Hydro June 1976, Recommendation III-22.
13. The Report of the Royal Commission on Electric Power Planning: Concepts, Conclusions and Recommendations, Pg. XVII.

majority of conservation efforts have been information and customer assistance programs. Only two programs that involve capital outlays to acquire concrete energy savings have been identified:

1. TRIM (in-house)	$1,800,000
2. Street lighting retrofit	$100,000

The Residential Loan Program may be classified as strategic conservation, but this program is a relatively passive approach to acquiring energy savings and, aside from administration costs, requires no outlay of capital.

These programs indicate little commitment to the direction given by past reviews for over a decade. Ontario Hydro has spent more on promoting electricity use. In 1985, Ontario Hydro spent $5.0 million on production and media costs for strategic marketing programs, and is budgeted to spend an additional $4.6 million in 1986. The scale of Ontario Hydro's expenditures on conservation is put in perspective when compared to the levels of expenditures reported by U.S. utilities active in demand-side management. The Pacific Gas and Electric Company (PG&E) spent $115 million, $233 million and $272 million in 1981, 1982 and 1983, respectively, on conservation activities alone.[14] These expenditures represent between 2 percent and 3.5 percent of PG&E's total revenue. Equivalent percentages for Ontario Hydro would mean the expenditure of between $98 million and $172 million on conservation in 1986 alone! The Bonneville Power Administration (BPA) spent $250 million on conservation in 1983, on revenues of $2.9 billion (80 percent of the conservation expenditures are capitalized).[15] This expenditure level has since been cut back to $125 million per year because fewer conservation resources were needed to meet demand which was falling. BPA has 36 conservation acquisition programs and 30 conservation research projects in operation.[16]

The U.S. utilities that have been most active in conservation, BPA and PG&E included, were motivated to do so because:

- Shortages were forecast (although this fear has subsided recently)

14. Exhibit 38, testimony of Art Rosenfeld, Lawrence Berkeley Laboratory, California.
15. Steve Hickok, Bonneville Power Administration, (April 16, N-30, p. 31).
16. Ibid, p. 33.

- Approval of supply options was highly uncertain
- Marginal costs of production were high, and remain high
- Regulation and government intervention demanded it.

Ontario's situation has been different. We have had a surplus, our marginal cost of production is low and there has been little government intervention (except to contradict the recommendations of past reviews by accelerating the construction of Darlington in 1981 to stimulate the economy). The only common element we have with these jurisdictions is the uncertainty of approval of major supply options.

Faced with a construction program that has given us a surplus of power for 15-20 years in total, there has been little justification for pursuing conservation. Instead, Ontario Hydro delayed construction schedules, pursued export sales, and promoted electricity use to increase the operating efficiency of our system. These activities have made a substantial contribution to keeping Ontario's rates among the lowest in North America. Ontario's electric power system has survived nicely, during a period of turmoil that wreaked havoc throughout North America.

BARRIERS MAY LIMIT ONTARIO HYDRO'S RESPONSE IN THE FUTURE

The adoption of a least-cost planning approach represents a substantial transition for Ontario Hydro. It is a slow and painstaking process. The traditional planning activities are giving way to different functions and processes. The new tasks require new skills and different organizational structures. But, demand-side technologies are still relatively new and unproven: data and analysis requirements are substantial, and little empirical data exists.

Ontario Hydro will require a tremendous effort to achieve a true balance between demand and supply resource investments. This balance will

not be achieved quickly, or without considerable reallocation of priorities and dedication of significant human and financial resources.

The utilities that have been successful in the new planning era have taken an entrepreneurial and aggressive approach

> "Utilities often lack an entrepreneurial attitude or aggressiveness in promoting their programs. The more successful programs are going to be those that have people involved who are very aggressive in bringing about success in the markeplace."[17]

Statements made at the hearings indicate that Ontario Hydro intends to step up its conservation activities as the surplus disappears.

> "In the years ahead, demand management will be an integral part of an overall strategy for meeting future needs. Central to Hydro's planning philosophy is the recognition that cooperative efforts by utilities, government and customers can significantly reduce growth in peak energy requirements and limit the need to construct new plants."[18]

But, as this section outlines, the Committee has some concerns about Ontario Hydro's ability to make this transition and whether or not it is an appropriate vehicle for delivering conservation programs. Its mandate, attitude and planning efforts seem to inhibit a balanced view of demand and supply options.

1. Ontario Hydro's mandate is restrictive. The Power Corporation Act (PCA) is the statutory instrument that establishes Ontario Hydro as a Crown corporation and sets out authority and responsibility of the corporation and its Board of Directors.

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17. T. Davis, (April 9, N-40, P. 18).
18. Tom Campbell, Chairman of Ontario Hydro, (April 2, N-35, p.5).

Ontario Hydro's activities on the demand-side are limited by the "power at cost" requirement for electricity pricing. Section 75 of the PCA outlines in great detail what is allowed to be included in the price of power that Hydro can charge to the municipal utilities. In 1981, when the Ministry of Energy wanted Ontario Hydro to do energy conservation programs (research and information programs primarily), an amendment to the PCA was required to allow the costs of the programs to be added to the cost of power.

Many of the new strategic conservation programs being deployed by utilities actually acquire conservation through rebates and grants for efficient homes or appliances. This type of program requires another amendment to the PCA.[19]

2. A long-term commitment to conservation is lacking.

While the industry pursues new planning approaches and is aggressively implementing conservation programs, Ontario Hydro is proceeding cautiously because it views conservation as a "risky area".[20] It is skeptical about the support for conservation among the public ("We are reasonably sure that the social ethic for conservation is rather low"[21]) and is skeptical about the potential of conservation resources - so much so that it is concerned about "overpromoting it to the point where it leads us to wrong decisions".[22]

Without direction from government, Ontario Hydro is likely to be very passive in its approach to acquiring conservation resources. It is conducting a major review of demand and supply options without evaluating the value of the most significant types of conservation programs - efficiency standards. The importance of this option is recognized . . .

> ". . . standards have a very valuable role to play . . . standards are clearly one of the ways you would bring about that larger chunk of potential that we identify . . ."[23]

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19. J. Johnson, Ministry of Energy, (April 15, N-47, p. 5).
20. H. Palmer, Ontario Hydro (April 3, N-37, p. 12).
21. Ibid, p. 33.
22. T. Campbell, Ontraio Hydro (April 2, N-35, p. 32.
23. R. Fleming, Ontario Hydro (April 3, N-37, p. 27).

. . . but, Ontario Hydro refuses to be proactive and evaluate the cost-effectiveness of standards and recommend programs to government for consideration. Listed under the title "Options not expected to make a major contribution in the 1990-2005 time period" is government intervention in the energy market.[24] Ontario Hydro is well aware of the significant potential these options have, yet provides no rationale for their exclusion.

The Committee finds it discouraging that broad and negative conclusions can be made about strategic conservation when Ontario Hydro has had direct experience with only a handful of programs.

> "Initially, savings come easily and they do not cost very much. Subsequently, it gets harder and it costs a lot more. Then you reach the point when you do not get much more saving and you put in an awful lot more money. To put the matter more ponderously, the law of diminishing returns takes effect with lightning speed in these matters."[25]

The program being discussed above (TRIM) resulted in $10 million in savings for a $1.8 million investment!

3. Although it is a step in the right direction, the demand and supply option study is inadequate. The demand and supply options study (DSOS) underway at Ontario Hydro is the largest and most comprehensive review of resource options ever done by the Corporation.

> "The demand and supply options study is one of the most important pieces of planning ever undertaken by Ontario Hydro."[26]

It is Ontario Hydro's first attempt at integrating demand and supply options into the planning process. New techniques are being used to evaluate the options. Sophisticated models have been acquired to assist in

24. Ontario 4, Demand/Supply Options Study, Report 652 SP, Feb. 1986, Table 5.2.

25. H. Palmer, (April 3, N-37, p. 10).

26. T. Campbell, (April 2, N-35, p. 2).

the integration of options and testing of alternative resource portfolios. Ontario Hydro is now in the second phase of a four phase process (see Appendix G). This phase will produce a tentative resource development strategy. The end product will be a resource development strategy that will provide a framework for the development of annual system plans for a decade or more.

> "The end product of the demand and supply options study will be what we call a resource development strategy. It is essentially a framework that will guide future decision-making. It comprises a set of principles and preferences that can be used to guide us when we make more detailed choices."[27]

The DSOS is more than just an isolated study. It is the beginning of Ontario Hydro's transition to a new phase of planning - developing resource plans to deal explicitly with uncertainty. The tools and techniques being used now, will be improved and refined as Ontario Hydro gains experience with them and as the quality of its data base is improved. But, the current study is still very important to decisions that will be made within the next five years regarding broad directions to take.

> "The focus is on the decisions that are required in the next five years, and these decisions will result in demand programs or supply options that will become effective within the next 20 years."[28]

Therefore, it is important that there be a thorough evaluation of all the options, using the same criteria and depth of analysis for each.

> "There is a danger of jumping to premature conclusions to some of these complex problems. I believe our most important consideration is that planning be founded on a thorough evaluation of all relevant factors."[29]

However, Ontario Hydro does <u>not</u> have the data necessary to support these models and allow for thorough evaluation of demand options.

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27. L. McConnell, (April 2, N-36, p.5).
28. L. McConnell, (April 2, N-36, p. 5).
29. T. Campbell, (April 2, N-35, p.2).

> "There are fairly complex statistical models that look at how customers make decisions and trade-offs. But even there, having accepted that you can develop a theoretical model that will do it, the real problem comes in getting good data that truly represents what the customers in Ontario traded off in a particular situation. We are expanding into these areas, but there is not yet a good data base to support a lot of these models."[30]

Because of a lack of data, Ontario Hydro compared its estimates of the potential for conservation to those in the 20-year plan of the Northwest Power Planning Council (NPPC). However, there are serious deficiencies in such a superficial comparison.[31] First, there are substantial differences in climate. Although there are comparable climatic areas in the Northwest, those areas have little population, and, therefore, less potential for residential conservation. The savings potential in Ontario is likely to be substantially higher because of a more severe climate.

Second, NPPC's acquisition of conservation resources was limited by its system's needs. There is more conservation available if needed, so the amount acquired does not necessarily relate to Ontario's potential.

> "We did a comparison with utilities such as the Northwest Power Planning Council and the amount that has been thrown into the pot seems reasonable. If the Northwest Power Planning Council expect to do these things, then the comparison we have done is a very rough estimate of whether our ballpark figure would also include those things. It is a hand-waving argument. I do not wish to be too specific."[32]

Ontario Hydro is carrying out a process that will provide a framework for decision-making for over a decade, but the data being used for a critical part of that review is inadequate. Conservation resources are not treated equally at this point.

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30. R. Fleming, (April 3, N-37, p. 34).
31. See remarks of R. Cavanagh, (April 1, N-33, p. 17-18) and R. Fleming, Ontario Hydro, (April 3, N-37, p. 17-18).
32. R. Fleming, (April 3, N-37, p. 27-28).

CONSERVATION IS UNDERVALUED IN THE MARKETPLACE

The market does not always adequately value conservation. First, it has no mechanism for recognizing the non-economic advantages such as preventing pollution and reducing uncertainty. And second, the mechanisms for assessing economic value do not function effectively.

The demand-side option, in effect, competes with the supply-side option in the market for energy services. However, the competition never occurs under perfect market conditions. A "level playing field" is difficult to achieve because there are so many players involved and so many diverse options to compare.

Despite the well recognized benefits of conservation, it is severely handicapped by a large number of market barriers. The marketplace acts as if conservation resources were less desirable than power plants, even though for most objective indices the reverse is actually true.

The following are the main reasons why the market does not adequately value conservation resources:

¶ Split incentives: most end-users do not buy their equipment or appliances. For example, the purchaser of a new home who is usually interested in the lowest life cycle cost, gets appliances which are purchased by the builder who is motivated to minimize the initial cost[33]

¶ Lack of information: information problems range from the simple consumer problem (not knowing about possibilities) to the complex technical problem (builders not knowing about optimum designs for buildings)

¶ Fragmented system: the decision-makers are a diverse group, including Ontario Hydro, building contractors, building owners, industrial companies, commercial organizations and individual home owners. The opportunities for each of these decision-making bodies

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33. D. Brooks, Marbek Resource Consultants, (April 9, N-41, p. 26).

EXHIBIT II.3

FEDERAL AND PROVINCIAL SUBSIDIES

TO ONTARIO ELECTRICITY OPTIONS IN 1984

($ Millions)

	Research And Development	Demonstration	Direct Support To Users	Tax Incentives	Debt Guarantee	Other	Total
Electricity							
Nuclear	209.3		2.9		223.8		436.0
Fossil	2.1		2.6		65.0		69.7
Hydraulic	1.0		2.7		46.2		49.9
Alternatives							
	22.3	2.8	3.3				28.4
Conservation							
	24.2	5.5	25.6	23.5	—	5.9	84.7
Total	258.9	8.3	37.1	23.5	335.0	5.9	668.7

Source: M. Berkowitz, University of Toronto, Exhibit 57

are not equal and each has unique criteria for making a decision. For example, Ontario Hydro's interest rates and amortization periods are not available to the building owner who is considering major retrofit, or to the individual who is purchasing a home. While the individual requires short payback periods for his conservation investment (usually less than three years), Ontario Hydro is making investment decisions for supply options that have 30-40 year payback periods

¶ Imbalance of subsidies: there appears to be a large imbalance of subsidies favouring supply options (Exhibit II.3). This imbalance distorts the allocation of resources in the marketplace (Appendix H).

The current rate structure is considered by many, including Ontario Hydro[34], to be a barrier to conservation. This topic has been the subject of great debate in Ontario for many years[35] and was, therefore, not included in the Committee's agenda.

THE DECISION-MAKING PROCESS LACKS OPENNESS AND ACCOUNTABILITY

There will be important policy choices made about demand and supply options in the near future - choices that will influence the nature and direction of our electricity supply system for decades to come. The Committee is concerned that the trade-offs inherent in such policy choices may not be made in the appropriate place and may be made with more concern about protecting the narrower interests of Ontario Hydro from the broader interests of the province as a whole.

Concerns about the appropriateness and type of controls the government should have over Ontario Hydro emerged as early as 1972 with Task Force Hydro and continued with the Select Committee on Ontario Hydro Affairs and the Royal Commission on Electric Power Planning (Appendix F).

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34. Ontario Hydro, Barriers to Strategic Conservation, (Exhibit 69, p. 4).

35. See Note 5.

EXHIBIT II.4

THE LEGAL AND INSTITUTIONAL FRAMEWORK HAS BEEN ALTERED SIGNIFICANTLY SINCE THE EARLY '70S

Coordination of energy matters → Ministry of Energy established

Public scrutiny of Hydro affairs → Royal Commission
→ Select Committee
→ OEB Act amended

Consideration of environmental issues → Ministry of Environment
→ Environmental Assessment Act created

The major conclusions of all three were remarkably similar. They found that responsibilities with respect to energy were widely dispersed through the government and the existing mechanisms for control were largely uncoordinated. They recommended that the government give high priority to the development of an energy policy and the creation of appropriate institutions and procedures for developing such a policy. Their views about making energy policy were extensive, but most significant was their perceived need for a strong, sophisticated, "open and flexible" institutional arrangement for obtaining advice from specialized groups and citizens and conducting hearings on major energy policy issues.

Over the years, the Government has modified the legislative/institutional framework in an attempt to make it more responsive to changes in the Ontario energy scene (Exhibit II.4). The Ontario Energy Board Act, the Environmental Assessment Act and the Consolidated Hearings Act are three recent examples where the Legislature has altered the legislative framework.

However, the answers have not been entirely satisfactory. The current decision-making framework continues to have serious limitations which inhibit policy formulation.

The four main elements of the decision-making process (see Exhibit II.5) for electric power planning are policy development, planning, evaluation and enforcement. In an ideal system these tasks would be well integrated into a process that is open and allows for public consensus building, and where the tasks and responsibilities of the agencies involved are clearly delineated. In our current system, we find problems at each level: policy direction is limited; Ontario Hydro's planning process is closed; and, the evaluation and review of key planning activities is a fragmented and uncoordinated process.

We find that a conclusion of the Royal Commission of Electric Power Planning is still relevant today, six years later.

> "The institutions and procedures for electric power planning in Ontario are not open, not integrated and do not constitute a comprehensive general planning process."[36]

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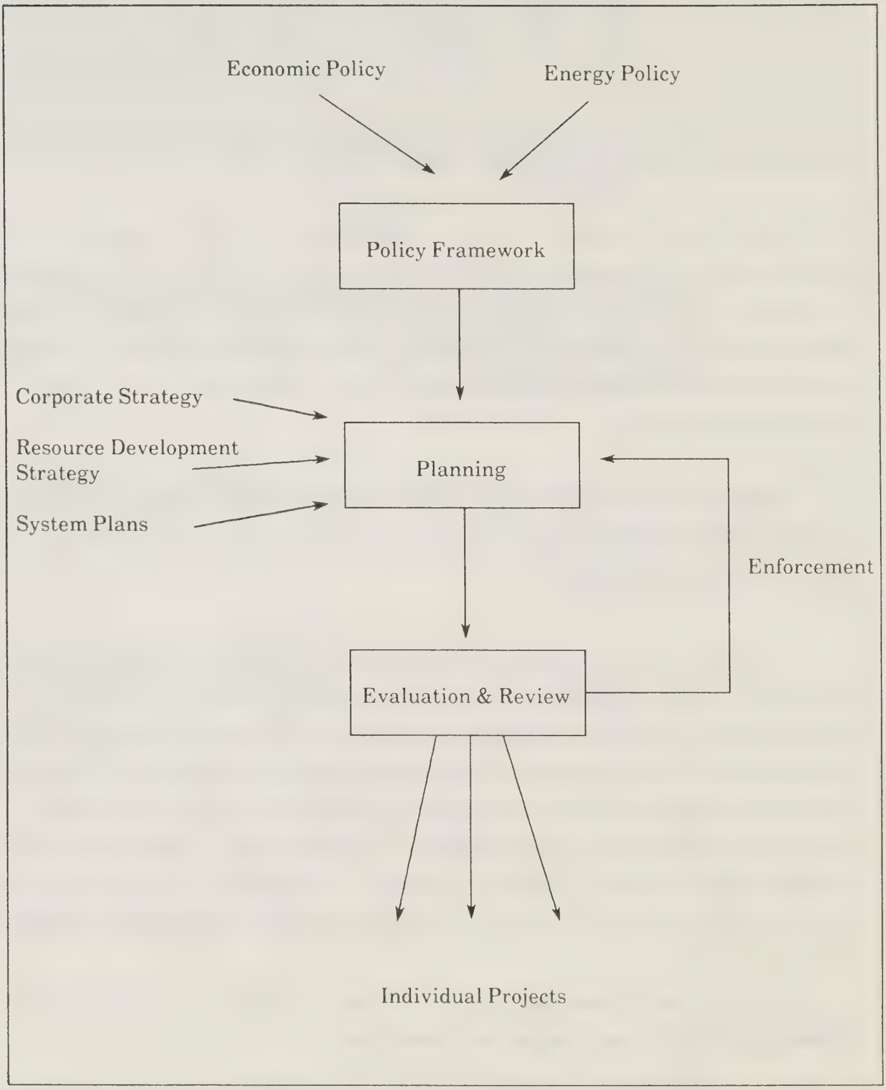
36. RCEPP, Volume 8, p. XIII, Feb. 1980.

EXHIBIT II.5

DECISION-MAKING PROCESS



This section reviews the problems and limitations of our current decision-making structure.

1. **Policy direction has been limited.** The Power Corporation Act established that the Ministry of Energy was to be responsible for the development and coordination of policy regarding Ontario Hydro. However, in view of its responsibility for other energy fields, its limited resources and its preoccupation with administrative matters, the Ministry has been unable to define a comprehensive policy framework within which long range electric power planning can occur. In 1980, the Royal Commission of Electric Power Planning wrote

> "Even though the Ministry has existed for six years, there is little evidence that it has been capable of responding to its major purpose and to the need for an energy policy framework."[37]

Six years later, the Committee has no evidence that the situation has changed. There is little indication that the Ministry has grasped the magnitude and importance of the transition occurring in electric power planning across North America. The Ministry appears to have avoided the opportunity to articulate a vision of where Ontario's electricity system should be at the end of the current planning horizon.

In June 1985, a document described as an energy policy paper and titled "New Directions for Meeting Tomorrow's Electricity Needs" was released by the Ministry as a guide to Ontario Hydro in the development of its Bulk Electricity Resource Plan. It covers such complex issues as electricity's role in the economy, load growth, alternative demand and supply options and the environment - all this in a total of four pages! The document is descriptive, raising issues Ontario Hydro should address, rather than providing any answers or concrete guidance for Ontario Hydro's planning.

More recently, the Ministry issued a document title "Fuelling Ontario's Future" as part of the Energy 2000 series. This document deals with all electricity options, from wind to nuclear, in ten pages. It is a discussion

37. RCEPP, Vol. 8, p. 11, Feb. 1980.

paper which provides only a brief overview of the issues. Apparently, policy recommendations are to result from "wide discussions and further examination of the issues and options for energy supply and demand to the year 2000". But, it is not clear who the discussions will be with, when they will take place or how the whole process fits into Ontario Hydro's current DSOS study. With the DSOS in its second phase, Ontario Hydro is now reviewing packages of resource options without clear goals or targets established by the government.

The Ministry of Energy has established a minor role for itself in the electricity policy area, avoiding the development of broad provincial goals and directions and choosing instead to concentrate on programs in areas such as small hydro and municipal solid waste and information programs for conservation. A buy-back rate and a target for small hydro (100 MW) are the most concrete electricity policy decisions which have recently been made by the Ministry.

While the Ministry has avoided direct involvement in key policy areas such as the future of nuclear or the prioritization of selection criteria, other jurisdictions have responded with bold, aggressive policy thrusts. In response to the convergence of social, economic and political variables in the electric power planning process, areas such as California and the Northwest U.S. have developed very comprehensive policy frameworks and participate as an active partner in the planning processes of their public and private utilities.[38]

2. Ontario Hydro's planning process is closed. The Power Corporation Act gives the Board of Directors of Ontario Hydro significant authority and responsibility including the power to approve:

- Long-range corporate strategy

- Annual operating and capital budgets

- Specific major capital expenditures and contracts

- Policies for the allocation of the cost of power and rate structures for both wholesale and retail sectors

38. See Note 6.

- Terms and conditions of contracts with municipal utilities.

Ontario Hydro guards its autonomy jealously, refusing to share with the public or with Legislative reviews valuable information regarding planning activities until it has received the approval of the Board of Directors.

As an example, Committee staff has learned, subsequent to the hearings, that Ontario Hydro marketing staff are preparing plans for major pilot projects to demonstrate the technical and marketing potential of strategic conservation. Other than a one-line statement made at the hearings, the Committee was unaware of the stage of development of these plans - plans which have been documented, distributed internally and redrafted - plans for up to $1 billion of expenditures within the current planning horizon. The information in this document reveals a great deal about the corporation's attitude towards marketing and conservation - information that is at the very heart of the issues being reviewed but, information the Committee cannot use in formulating its recommendations. If this incident exemplifies the spirit of cooperation between Ontario Hydro and the Government, it is no wonder the decision-making process is ineffective.

The public is no longer content with a process that allows such important decisions about our future to be made through the private deliberations of Ontario Hydro's planners. The public is demanding a greater voice in the determination of our energy future. The concerns about electrical energy issues have become so strong that future power development of large scale generation plants appears to be stymied. New coal and nuclear plants have become matters of intense public controversy as they are seen to have tremendous impact on our economy and environment. Public involvement is critical to the success of a decision-making process. With the problems incurred at the Bruce transmission line hearings, we have seen what can happen when public consensus has not been developed and when public involvement occurs too late in the planning process.

Ontario Hydro, on their own accord, has launched a number of public participation programs related to the planning process. The most significant one involves 58 public interest groups commenting on the DSOS. These steps

are significant and positive, but they still fall short of making Ontario Hydro's planning process fully open and responsive to the public.

The Ministry of Energy and the Cabinet are not involved in the early stages of Hydro's planning, either. The DSOS is a good example. Were it not for the Select Committee choosing to review demand and supply options, the government would have depended on materials produced by Ontario Hydro for public consumption. The government is expected to be consulted after the completion of Phase 2 - over two years after the project was initiated, and after the major resource packages have been chosen.

As the diagram below shows, the options have been circumscribed by the time government has the opportunity to participate. By that time, the participation is in the form of review rather than input. And, it is very difficult to review a decision after the fact, once the analysis has been done and the arguments formulated.

Ontario Hydro has consciously chosen to exclude appliance efficiency standards and stronger building codes from its scenario analyses. Should the government have the opportunity to ask Ontario Hydro to use its sophisticated models to include options, such as standards, which it may be considering?

Government Input Occurs Too Late In The Planning Process

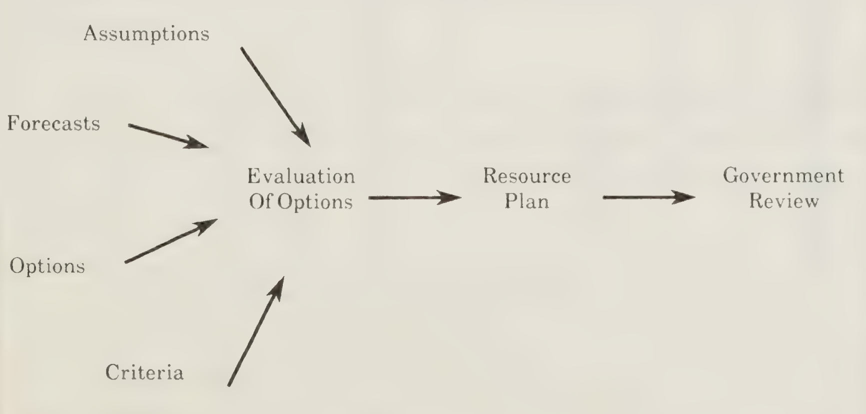


EXHIBIT II.6

THE LEGAL/INSTITUTIONAL FRAMEWORK IS FRAGMENTED AND UNCOORDINATED

Planning Activity	Agencies Involved	Comments
Corporate Strategy	Legislative Committees Ministry of Energy → Cabinet Treasury → Cabinet Premier → Cabinet	. Ad hoc reviews . Emphasis on Hydro's economic influence
Resource Development Strategy	Ministry of Energy	. Review only
Annual System Reports	Ministry of Energy	. Review only
Individual Projects	Cabinet → Environmental Assessment Board	. Cabinet approval required
Electricity Rates	Minister of Energy ⇄ Ontario Energy Board	. Review only
Load Forecast	Ministry of Energy	. Review only . Independent forecast published by Ministry
Borrowing	Treasury → Cabinet	. Approval authority

3. The process of evaluating and reviewing of key planning activities is fragmented and uncoordinated. Legislation and institutions that were appropriate for considering the development of the power system on a project-by-project basis do not appear to be adequate for dealing with the economic, social, environmental and technological issues of this new era of electric power planning. In fact, we do not have an agency or policy body that is capable of assessing the complexity of issues and policy implications of Ontario Hydro's current demand and supply options study.

The Cabinet has important responsibilities given to it by the Power Corporation Act. Among other things, it has final authority over

- Major projects
- Borrowing requirements
- Research and development expenditures.

As Exhibit II.6 shows, these activities are only a small part of the key planning activities. The Ministry of Energy has the opportunity to review most of the major plans, but, once again, the planning process is not open and the Ministry is consulted after the fact. The Ministry has had no Memorandum of Understanding with Ontario Hydro for over a year. This document should play a major role in clarifying the objectives and priorities of Ontario Hydro and defining its operating relationship with the Minister and the Ministry.

Aside from the ad hoc reviews of Legislative Committees, there are no regular public reviews of Ontario Hydro's resource plans. The only opportunity for critical evaluation occurs when Ontario Hydro requests approval of a major project.

It is the Committee's position that, while they have an important role to play for the Legislature, ad hoc reviews are a less-than-optimal mechanism for critically evaluating complex planning issues. In this particular review, the Committee had several months to prepare for 12 days of hearings on options that Ontario Hydro has spent millions of dollars to review and three years doing so. To add to the imbalance, the review has focused on Phase I,

which was completed in the November 1985, and not on the issues being dealt with in the second phase.

The Ministry of Energy and the Ministry of Treasury and Economics advise Cabinet on key decisions, but they have no regularized, formal processes for getting public input, nor do they have the resources to adequately assess the policy implications of Ontario Hydro's DSOS. When Treasury reviews borrowing requirements, it has no publicly approved resource plan, or energy policy framework to help in evaluating the request. The same applies to the Ontario Energy Board (OEB) as it reviews rates on behalf of the Ministry of Energy.

CHAPTER III

STRONG ACTION IS REQUIRED TO ENSURE THE PROVINCE BENEFITS FROM A BALANCED SYSTEM IN THE FUTURE

Decisions about our electric power system are important, not only because the financial stakes are high, but also because a number of other economic, social, environmental and political considerations have converged in the planning process. The issues we face involve a wide range of competing interests and require the allocation of costs, benefits and risks in our society. At the same time there has been too little opportunity for building public consensus on important and controversial issues. Government input has been limited and review bodies do not have adequate authority or sufficient resources to do a thorough job. Important matters of public policy have effectively been treated as matters for Ontario Hydro's corporate strategy. Changes must be made. Appropriate institutions and decision-making processes must be in place to ensure that by the year 2000 Ontario benefits from a more flexible system with a balanced mix of demand and supply options.

The Committee believes that Ontario Hydro is still the best vehicle for exploiting the opportunities made available by the changing industry and for leading the province towards a more balanced electricity system. To override the barriers that might limit the ability of Ontario Hydro to carry out this task, the government must give strong and clear direction to the Crown corporation:

- Requiring it to concentrate on cost, flexibility and reliability, leaving decisions on environmental and social considerations to the government

- Requiring the development of a strong planning process which is rooted in detailed end-use forecasting

- Requiring the development of a strong empirical database for conservation derived from full scale demonstration projects in each sector

- Requiring Ontario Hydro to develop a conservation strategy for distributing its benefits throughout the Province, and prohibiting the application of the "no-losers" test.

The Government itself must take several initiatives in areas outside the purview of Ontario Hydro to help build a better balance between demand and supply options. First, the Government must take steps to acquire "lost opportunity" resources - the resources that we lose every time an inefficient building is constructed or an inefficient appliance is purchased. The Government must support a tougher building code and the development of standards for appliances.

Second, the Government must amend the Power Corporation Act to allow Hydro to participate in the full range of conservation options.

Third, the Ministry of Energy must develop comprehensive plans for the development of parallel generation - specifically, cogeneration, small hydro and municipal solid waste.

For our planning and decision-making processes to function more effectively they must feature openness and accountability. The Committee advocates modifications, not dramatic changes, to the current planning and decision-making processes to allow for meaningful public input on key planning issues and effective political control over the determination of our electricity future.

Guidelines must be developed for Ontario Hydro's planning process to ensure that the best techniques and methodologies are used to seek options which are in the best interest of society. Hydro's planning must be more open, involving key stakeholders at early stages, prior to public review. We propose a number of Task Forces and workshops designed to make Ontario

Hydro work more closely with industry allies, customers and experts to develop acceptable and implementable plans.

Ontario Hydro's resource plan must then be evaluated critically in an open forum that allows for full discussion of planning issues. The Committee believes that the Ontario Energy Board (OEB) can provide such a forum. Specific guidelines must be implemented to ensure Ontario Hydro's submissions are thoroughly reviewed.

And, finally, there must be greater accountability. Cabinet must review and approve the resource plan after receiving the OEB's report. The Committee also proposes that the OEB be given the responsibility of determining wholesale rates.

ONTARIO HYDRO MUST BE GIVEN STRONG DIRECTION TO PURSUE A MORE BALANCED SYSTEM

Despite the concerns about Ontario Hydro's mandate, practices and policies expressed in Chapter II, the Committee believes that Ontario Hydro continues to be the best vehicle to spearhead Ontario's efforts to build a capability in conservation and to lead the province toward a balanced electricity system. The Committee's reasons are as follows:

¶ To maximize the benefit to the system of conservation resources we need to acquire those resources which are cost-effective. To attain the "least cost" system, all resources have to be considered equally in an integrated planning process. Ontario Hydro has the planning resources and necessary tools to carry out the task

¶ Ontario Hydro is province-wide and has the basic elements of a system (regional offices, etc.) that could deliver conservation programs to the customers

¶ A second public organization would be wasteful and redundant. Ontario Hydro is a public corporation that, in the final analysis, must do what the government wishes - provided the government gives clear direction.

Ontario Hydro is developing a new approach to planning to evaluate resource options and to identify the best course for Ontario's electricity future. As it develops a resource plan it will be considering a variety of important social, economic and political variables. We must ensure that Ontario Hydro evaluates all of the demand and supply options fairly, that it does so within the framework of government policies, and that it doesn't employ policies or practices that restrict the potential of beneficial demand options.

Ontario Hydro's major priority is to maintain an efficient and reliable system. Because the future is highly uncertain and conditions are likely to change, the management of risk becomes a new priority for Ontario Hydro. Ontario Hydro must develop a resource plan that manages risk by balancing the following objectives:

- Minimize rates - by acquiring low cost resources
- Increase flexibility - with smaller options and shorter lead times
- Increase reliability - by increasing the diversity of our resource base.

Controversial social and political considerations such as customer equity, employment, economic stimulation and environmental protection must be decided upon by government and conveyed to Ontario Hydro through policy direction. To ensure that decisions involving key social and political trade-offs are not being made privately, in Ontario Hydro's planning process, the Committee recommends that:

Recommendation 4:

> **The Ontario Government should specify the social, environmental and political framework within which Ontario Hydro's planning is to take place.**

A key planning challenge facing Ontario Hydro over the next decade, is to determine whether conservation resources can reliably substitute for new generation at a comparable or lower cost.

The first step is to develop a forecast that is tied directly to the existing and anticipated end-uses of demand. There is no substitute for the end-use model as the primary forecasting tool. It is a more accurate tool for forecasting demand and its data is absolutely critical for assessing the potential of demand-side programs and for tracking the effects of actual programs.

The system must have an inventory of residences, appliances, heating systems, commercial floor space, industrial processes and so on, both in terms of absolute numbers and average efficiencies. Extensive survey techniques have been developed by many utilities to assist in this process.

Initially, Ontario Hydro's end-use models were used for marketing purposes and were, therefore, short-term in outlook. Ontario Hydro is now in the process of acquiring new end-use models and extending its end-use model forecast to the 20-year planning horizon. However, its experience with long-term forecasting using the end-use model is limited and is currently inhibited by a lack of data.[39]

The principle reason for this limitation is Ontario Hydro's unwillingness to give end-use models a high priority. In 1980, the Royal Commission on Electric Power Planning recommended the use of end-use models. The Government supported this recommendation, but Hydro has not responded with a strong commitment - six years later, the models remain unreliable because of a lack of data. Furthermore, Ontario Hydro does not intend to use the end-use model as its primary forecasting tool.[40] It continues to rely on a predictive load forecast.

The prediction resulting from an econometric model ignores uncertainty and gives the appearance of objectivity - a future that one has to prepare for.

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39. M. Rothman, Ontario Hydro (April 2, N-36, p. 31).

40. C. MacKay-Lassonde, Ontario Hydro (April 2, N-36, p. 33).

EXHIBIT III.1

RESOURCE PORTFOLIO ANALYSIS AT THE NORTHWEST POWER PLANNING COUNCIL

There are considerable uncertainties about the future resource needs of this region. To address these uncertainties, the Council developed a Decision Model that explicitly models the cost outcome of many different resource decisions under hundreds of possible load growth paths. This model was developed in conjunction with Bonneville, the Pacific Northwest Utilities Conference Committee (PNUCC), and the Intercompany Pool.

In developing the resource portfolio, the Council recognized that future loads were not likely to grow along any one of the four forecasts. Therefore, it used 500 individual loadpaths to describe how the region's future load levels might change. The Council's analysis follows each load path and simulates the acquisition of new resources over the next 20 years. Based on the needs of each loadpath, the region may hypothetically begin conservation programs, acquire options on generating resources or construct resources that have been optioned previously. This analysis thus simulates the process of making decisions based on forecasts of future loads. Because these decisions must be made without specific knowledge of actual loadgrowth. The analysis incorporates decisions that lead to both over-and under-building of new resources. This process meant to simulate accurately the inherent uncertainties that lead to periods of surplus or deficit.

A resource strategy is developed for each of the 500 load paths. The analysis then calculates the cost of constructing and operating the resources within the existing Northwest power system The result across all 500 load paths gives a distribution of present value expected costs. This helps identify the strategy with the lowest expected costs. It is also useful in identifying strategies to manage the wide range of uncertainty the region faces.

Another system model provided more explicit analysis of the cost of building and operating resources. The System Analysis Model begins with a given load and given resources to meet that load. This model assesses operation of both existing and new resources within the region's hydropower system in much greater detail and, therefore was useful to validate and check the results of the Decision Model and to perform the avoided cost studies described later in this chapter.

Using these analytical models, the Council evaluated a variety of resource priorities. Through the analysis of various sequences, the Council was able to establish a priority order for the region to meet its power needs at the lowest possible cost. The priority order finally selected by the Council to minimize future cost begins with the model conservation standards and is followed by the other conservation programs, then by hydropower, better use of hydropower (combustion turbines), cogeneration, and large coal plants.

The Council also developed decision rules for the region to follow in acquiring options and in making the decision to build resources. The option level is that percent of the range of loads to which the region should plan to acquire options in order to insure against future load uncertainties. The most cost-effective option level was determined to be approximately 90 percent of the load range. This means that the Council's portfolio includes the cost of optioning resources to meet the needs of 90 percent of the forecast loads on each load path over the next 20 years.

On the other hand, assuming an options inventory that can cover high loads, the most cost-effective level to build resources to is only 50 percent of the forecast load range. This means that the region should build resources to meet the needs of a load forecast which has approximately half of all the possible load paths above it and half below.

Source: 1985 Northwest Conservation and Electric Power Plan

What we should be striving for, in Ontario, is an approach that frees us from simply responding to the prediction of forecasting model and allows us to explore a variety of options under a range of likely scenarios.

The range of scenarios is created by developing high and low projections of additions to the end-use inventories. The result of this process is a band of forecasts that has two important functions. First, it is an explicit statement that the future is uncertain. Second, it represents a judgement on the potential futures that Ontario Hydro should plan and invest for. The value of an option or mix of options is then determined by evaluating its consequences across a wide range of potential futures. The approach used by the Northwest Power Planning Council provides an excellent example of how the value of resource options can be assessed over a range of possible futures (Exhibit III.1).

In such a process, decisions are not based on the traditional "most probable" forecast. The attractiveness of an option is determined by its value in not one, but many possible futures. By dealing explicitly with uncertainty, the process has put a value on flexibility and diversity - the more flexible and diverse options will appear most attractive as they will have the lowest present value of expected costs (over a distribution of possible load paths).

Ontario Hydro has the necessary information on supply-side options to carry out this type of analysis. For the demand-side, however, this analysis requires information Ontario Hydro does not have - detailed end-use data and more knowledge about the cost and penetration rates of conservation options. In the current DSOS, the "most probable" forecast is based on an econometric model which, because of its nature, cannot identify the potential for strategic conservation. The estimates of strategic conservation are derived from Ontario Hydro's end-use models which, by Hydro's own admittance, are not reliable over the planning horizon.

Since end-use models are an essential step in a planning process that builds a balanced system by integrating demand and supply options into a resource mix, the Committee recommends that:

Recommendation 5:

> **Ontario Hydro should use its end-use model as the primary tool for forecasting future demand for electricity. Additional resources must be assigned to the task of acquiring the necessary data to make the end-use model operational as soon as possible.**

Ontario Hydro also claims to recognize uncertainty by using a range of forecasts. The usefulness of Ontario Hydro's band is very limited because it is not based on an assessment of likely scenarios. Instead, it is based on a statistical analysis of load forecast errors from the past 25 years. Ontario Hydro then attempts to construct econometric scenarios to match the high and low forecasts determined by the error range - rather than developing scenarios based on the instrumentalities of demand. Ontario Hydro is, therefore, unable to determine the distribution of present value expected costs for an option over a range of possible forecasts. Instead it assesses the option's value, for meeting a single demand line, and does not build into the evaluation any value for the flexibility of an option.

Recommendation 6:

> **As the basis of its planning exercise, Ontario Hydro should develop a range of plausible scenarios based on end-uses. Alternative resource mixes must then be evaluated over a range of plausible scenarios, rather than a single line, "most probable" forecast.**

Although Ontario Hydro is making efforts to improve its data base and to increase its use of end-use models it has a long way to go before being able to integrate the forecasts into the planning process to the level of sophistication that is described in Exhibit III.1. Because the forecast is such

an integral part of the resource planning process, there should be greater participation by the public and government in its development. Ontario Hydro has established an external committee consisting of forecasters and economists which reviews a draft forecast, but this is not a formal requirement. The Ministry of Energy publishes its own forecast which it submits to Ontario Hydro for Ontario Hydro's consideration in its forecast. The Ministry has no formal involvement with Hydro's forecast prior to its approval by the Board of Directors.

Recommendation 7:

> **Prior to approval by the Board of Directors, a draft of Ontario Hydro's range of forecasts should be made available to the public and distributed widely to experts and interested parties. The external committee for reviewing the draft forecasts should become a formal requirement of Ontario Hydro's planning process.**

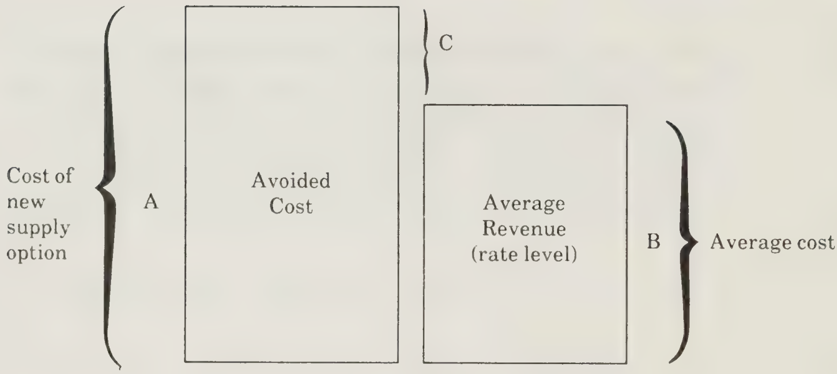
Recommendation 8:

> **Prior to final approval of the forecast by the Ontario Hydro Board of Directors, the Ministry of Energy should be required to publish, in addition to its own forecast range, a formal response to Ontario Hydro's draft forecast range.**

Once Ontario Hydro has an adequate data base and uses the end-use model in the planning process, it will be in a position to estimate the potential of most conservation programs. An important issue affecting the potential of conservation revolves around the criteria used to evaluate and screen alternative conservation programs. One screening test, the "no-losers" test, is of particular concern to the Committee.

EXHIBIT III.2

APPLICATION OF THE "NO-LOSERS" TEST



According to the rules of the "no-losers" test, the amount allowed to be spent on conservation programs is equal to (C), above (avoided cost less average cost).

If Ontario Hydro builds new plant to meet an increase in load demand, then it pays an amount equal to (A) in Exhibit III.2, opposite. As the new load demand comes on to the system, Ontario Hydro receives revenue, equal to (B). However, Ontario Hydro can choose to meet the extra load demand by acquiring energy savings elsewhere in the system. If these savings cost the same as the supply option, then costs have increased by amount (A), but the revenue base has remained unchanged (because there is no net increase in customers on the system). Therefore, the rates must increase more than in the case of the supply option because there is a smaller revenue base over which the costs are spread.

Customers receiving the incentives to reduce their energy use will benefit - although their rates go up more than they would if the supply option was chosen, their decline in usage lowers their total bill. However, the customers who do not adopt the conservation option will pay higher rates and higher electricity bills.

If Ontario Hydro chose to ensure that non-participants would not lose more from the implementation of conservation option than they would from the best supply option, then it would not spend more than an amount equal to (C). In effect, the conservation option is penalized by an amount equal to the revenue lost to the utility by the reduction in demand. This criteria is what is commonly referred to as the "no-losers" test.

In Ontario our avoided cost (A) and our average revenue (B) are very close. As a consequence, Ontario Hydro calculates that the potential of strategic conservation is reduced from 4,000 MW in the year 2000, to 1000 MW under the no-losers test.

There are many problems with the "no-losers" test:

¶ It contradicts the principle of supplying electricity services at the least total cost to society. The test will exclude many conservation options that cost less than the best supply option

¶ It views utility conservation programs as "subsidies" rather than as "purchases" of an energy resource from the cheapest available source

¶ By evaluating individual conservation options, it precludes the development of a conservation and efficiency strategy whereby an entire package of options can be designed to ensure conservation occurs across the province and in all classes of customers

¶ It is not applied to other aspects of the electricity system where, using the same logic, it should apply. For instance, the person whose electricity usage does not increase is forced to pay higher rates to subsidize the additional costs of new generation which is constructed to meet increasing load. If we aren't concerned with the loser on the supply-side, should we be concerned about the losers on the demand-side?

If the "no-losers" test is not applied Ontario Hydro will have an additional incentive to maximize the penetration of conservation programs, spreading their benefits across the province. If incentives for customers to install cost-effective efficiency improvements are substantial and if marketing efforts focus on traditional non-participants, Ontario Hydro can ensure a high penetration rate for any particular program. And, Ontario Hydro should not be focusing only on individual programs, but developing a strategy to lower the costs of the province's energy services that includes a wide-range of innovative programs for all sectors and customer classes.

It is clear that conservation programs that cost no more than the cheapest supply option are better for the province as a whole over the long term because they lower the cost of energy services, they are more flexible, have shorter lead times, come in smaller increments, help to diversify our resource base and prevent damage to our environment. Accordingly, the Government should not turn its back on future generations because of minor difficulties that can be overcome through proper program design and implementation.

Recommendation 9:

> **Ontario Hydro must develop a comprehensive conservation strategy employing a wide range of programs to ensure that the benefits of conservation resources are distributed widely throughout the province. In its assessment of individual conservation options, Ontario Hydro must be explicitly prohibited from using the "no-losers" test as a screening tool.**

As Ontario Hydro develops its conservation strategy, it will need to answer two important questions: how much will the energy savings cost? and, how much of the potential can actually be secured? Costs must be determined in a rigourous manner so that the conservation resource options can be compared to other resource options. And, the penetration rate is critical because of its affect on the forecast.

There is a large and growing base of empirical data for the entire spectrum of conservation programs across North America. However, this data is not always transferable because of the differing economic and geographical characteristics between regions. Recognizing this limitation, Ontario Hydro has indicated that it intends to conduct one or more technical and market demonstrations of conservation programs. Since demonstration projects produce concrete evidence of costs and market potential, they are absolutely critical at this stage of Ontario Hydro's planning. The objectives of a demonstration program would be to determine:

- Maximum realizable penetration rates of potentially cost-effective programs

- The impact of conservation measures on the transmission and distribution system

- The effectiveness of different marketing and promotion approaches, and

- The costs of implementation.

Major demonstration programs take four to five years to plan, operate and evaluate. The most elaborate project of this type in North America is the Hood River Conservation Project (Appendix E) operated by the Bonneville Power Authority. This project will cost U.S. $19.7 million ($27 million Canadian) and take 3.5 years to complete. Considering the value of the demonstration programs to planning efforts and their lead time, the Committee recommends that

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Recommendation 10:

> **The Government should direct Ontario Hydro to initiate, as part of its resource plan, three large scale technical and market demonstration programs for conservation, up to $25 million each, in each sector (residential, commercial and industrial).**

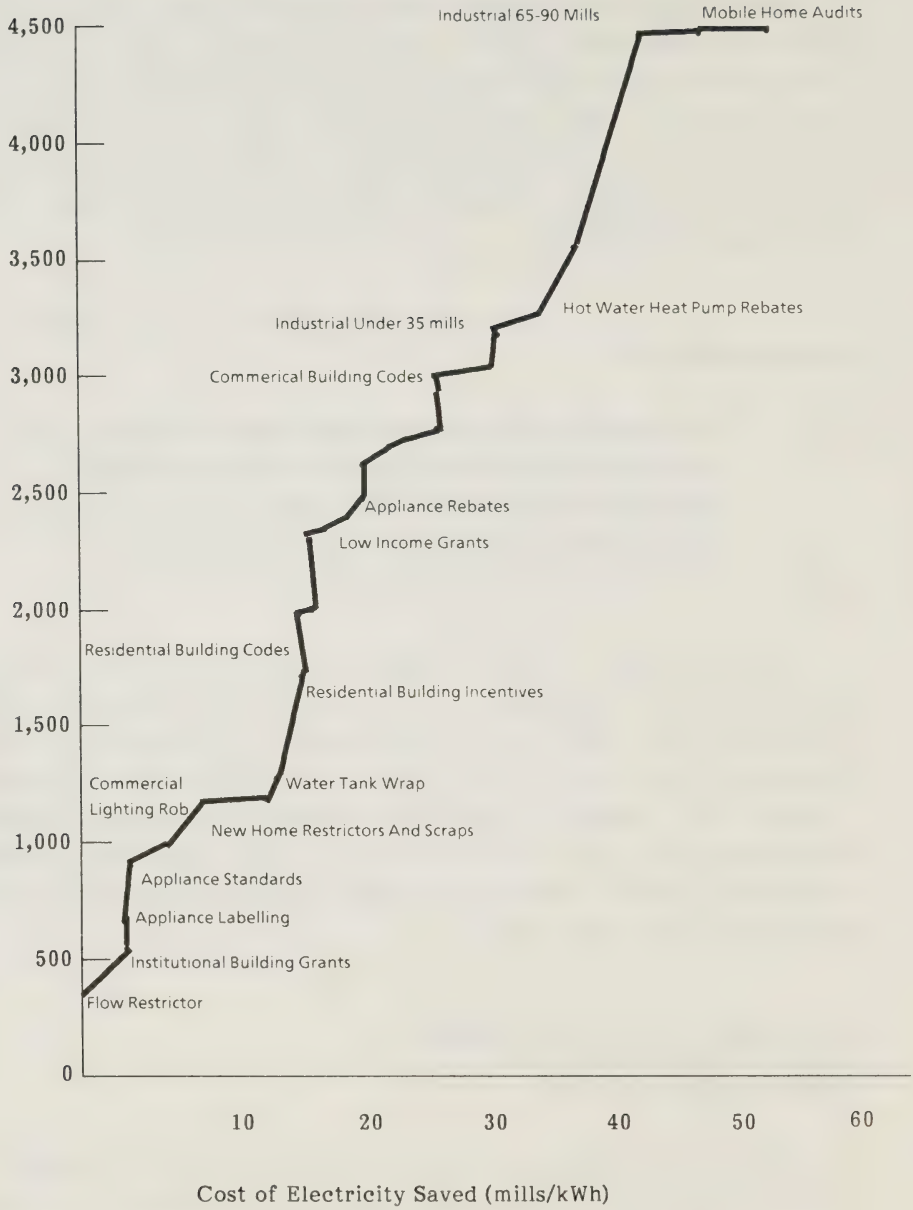
The Government, in directing Ontario Hydro to initiate demonstration projects, may wish to participate in the selection of the communities and industries involved. The communities and industries involved stand to benefit immediately by as much as 75% of the total project's cost (in labour, materials, etc.), in addition to the millions of dollars of energy savings which will accrue over the life of the measures. It may be desirable to choose communities that are economically depressed and industries that would benefit most from energy savings.

GOVERNMENT ACTION IS REQUIRED TO OVERCOME MARKET AND INSTITUTIONAL BARRIERS

There are a number of market and institutional barriers outside of Ontario Hydro's planning process that inhibit the development of a more balanced system. This section outlines the Committee's recommendations for Government action to overcome market and institutional barriers that inhibit the implementation of conservation.

Exhibit III.3

Conservation Supply Curve For Pacific Northwest



Source: Synergic Resources Corporation

As indicated earlier, in general, conservation resources are undervalued because of split incentives, a lack of information, a fragmented system of decision-makers and an imbalance of subsidies. To overcome these barriers, the government must take steps to capture, through efficiency standards, the large potential conservation resources that will, otherwise, be lost.

Ontario Hydro is restricted by its mandate from actively pursuing conservation. Accordingly, the Power Corporation Act should be amended to permit Ontario Hydro to participate fully on the demand-side.

The Ministry of Energy should establish plans for the promotion and development of parallel generation. This option could help diversify our resource base, but is currently underutilized.

Since Ontario Hydro and the Government will be taking action to pursue conservation resources and parallel generation, major firm purchases are not needed and should not be pursued at this time.

1. Capturing "lost opportunity" resources. Through demonstration projects Ontario Hydro will be evaluating options that are available to it as a utility. Beyond Ontario Hydro's purview, there are a number of options that are apparently low-cost and have tremendous potential. These are options designed to capture "lost opportunity" resources - a stronger building code and appliance efficiency standards. Exhibit III.3 shows that for the Northwest U.S., appliance standards and building codes are among their cheapest conservation options. It costs less to build efficiency in a structure then it does to upgrade the building or replace the appliance. Regardless of the current capacity position, these resources are valuable to society because once an inefficient building or refrigerator is in place, it could continue to waste electricity for 30 years or more. This is why they are referred to as "lost opportunity" resources. These options are an effective way of avoiding the barriers caused by split incentives and payback gaps.

In addition to the savings generated for consumers, appliance standards have the important advantage of forcing our appliance industry to keep up with a world-wide trend to smarter, smaller and more efficient appliances.

In the face of world wide trends towards more efficient appliances, the Federal Government recently withdrew funding from the ENERGUIDE program - an appliance labelling program. Although appliance labelling and efficiency standards are thought to be the responsibility of the Federal Government, evidence presented to the Committee suggests that there may be options open for provincial initiatives. The Committee strongly supports the concept of efficiency standards and labelling programs for appliance standards and recommends that:

Recommendation 11:

> **The Ministry of Energy should investigate the feasibility and desirability of provincial action in the development and implementation of labelling programs and efficiency standards to encourage the production and use of high efficiency appliances. The Ministry should also develop a plan to encourage the construction of more efficient buildings using incentives and/or strengthening the existing building code.**

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2. Ontario Hydro should be allowed to participate fully in strategic conservation. Utilities can also play an important role in the upgrading of new buildings and appliances. There are numerous incentive programs being conducted across North America where the utility provides loans or direct grants for building improvements (new and existing). Some of the more innovative programs on the appliance side pay rebates to the appliance salesman for selling efficient units.

This type of program is part of an entire spectrum of programs in conservation, ranging from information dissemination to direct payment for energy-saving devices (Appendix E). As noted and discussed in Chapter II, Ontario Hydro is current prohibited from conducting some of the more aggressive options. Accordingly, the Committee recommends that:

Recommendation 12:

> **The Power Corporation Act should be amended to allow Ontario Hydro to engage in the full range of options for promoting conservation.**

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3. The Ministry of Energy should develop specific plans to promote parallel generation. Ontario Hydro estimates that approximately 410 MW of cogeneration (340), municipal solid waste (50) and small hydraulic (20) will come onstream by 2000. With incentives and development programs Ontario Hydro believes this number could be as high as 1400 MW. The major barriers which inhibit the attainment of such potential are:

¶ Financing difficulties: the current contracts are too short in time span and contain uncertainties which make financing difficult for small hydro operators. The contracts are five-years in length and the rates have no floor price. Consequently, revenues are difficult to predict for a normal business planning horizon

¶ Lack of an infrastructure: there is little experience with cogeneration in Ontario. A few large industries have installed cogeneration facilities, but the province has little expertise or capability to promote and install cogeneration facilities. Several energy services firms are developing capabilities in this area. Ontario Hydro has received approval from the Board of Directors to conduct initial studies. There are preliminary plans to launch technical demonstration program

¶ Several important questions about parallel generation remain unanswered:

- How much is good for the system? In California, contract terms were so attractive that applications were received for 15,000 MW of private generation. The contract offers had to be

withdrawn. Before we develop a program to promote parallel generation we should have an idea of how much is desirable

- What is the price that best reflects the value to the system of independently produced power? To date, rates have been set somewhat arbitrarily. Should the buy-back rate equal avoided cost? or average cost less a transmission charge? Should it reflect a value for flexibility and diversity?

These are complex issues beyond the scope of the current hearings. However, the Committee recognizes the general advantages of parallel generation for the system and the province. Because the issues related to these options are beyond the expected role of Ontario Hydro, the Ministry of Energy must accept a greater responsibility for the promotion of these alternatives and take deliberate action to clarify the outstanding issues which inhibit their potential.

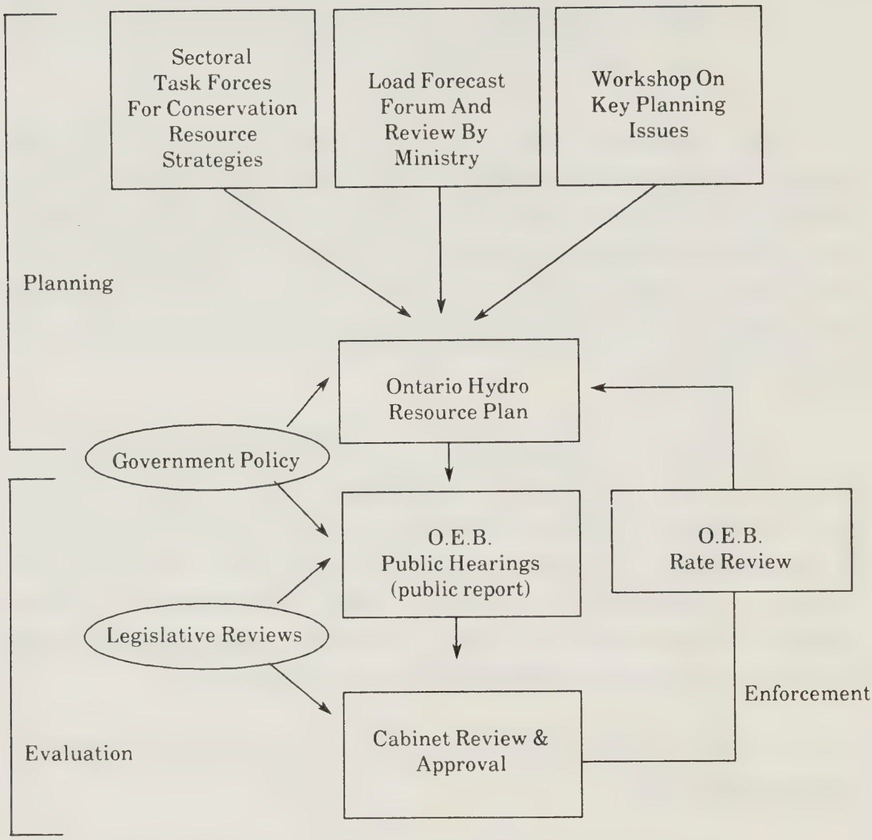
Ontario Hydro is responsible for the efficiency and reliability of the electricity system. Accordingly, Ontario Hydro and the ratepayers should not be required to pay more for parallel generation than it is worth to the system, nor should they have to purchase greater quantities than is desirable for the system. If higher-priced or additional parallel generation is considered desirable for environmental reasons or to stimulate local employment, these subsidies should be part of a separate government program.

Recommendation 13:

> **The Minister of Energy should request the Ontario Energy Board to hold a public hearing to determine the price which best reflects the value of parallel generation to the system, and to determine the desirable amount of parallel generation that could be added to the system within the current planning horizon.**

EXHIBIT III.4

PROPOSED PLANNING & DECISION-MAKING PROCESS



Recommendation 14:

> **The Ministry of Energy should develop and publish detailed plans for parallel generation options including:**
>
> - **Specific targets**
> - **Financial and contractual arrangements**
> - **The role of Ontario Hydro in promoting parallel generation**
> - **Additional research, development and demonstration programs needed**
> - **Information and marketing efforts.**
>
> **The Government must direct Ontario Hydro to incorporate these plans into its own annual resource plans.**

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4. Major firm purchases should not be pursued at this time. To have large quantities of power available by 2000, Ontario must enter an agreement with either province shortly, to allow planning and construction of new facilities to proceed. Although such purchases would diversify our resource base they are not an attractive option for Ontario at this time for the following reasons:

- With Darlington, we will have a capacity surplus until the mid to late 1990s, after which demand-side options must be our priority to balance our system

- A major power purchase would not be a flexible option, and

- There is a heavy economic burden - purchases would export jobs without any cost advantages to the province.

In the mid 1990s, when a major purchase agreement is evaluated again, the transmission interconnections will be a limiting factor. In the future, as

Quebec signs additional agreements with northeastern states, it will need to access Ontario's transmission system.

With this in mind, it may be desirable for Ontario to pursue favourable rates for smaller amounts of interruptible power to subsidize the strengthening of our interconnection and increase our flexibility for choosing major purchases in the future.

Recommendation 15:

> **The major firm purchase option should not be pursued at this time. It should be re-evaluated once cost-effective indigenous resources, such as conservation and cogeneration, have been utilized.**

OUR PLANNING AND DECISION-MAKING STRUCTURE MUST FEATURE OPENNESS AND ACCOUNTABILITY

The Committee strongly believes that our system must be more coordinated to facilitate better cooperation between government, Ontario Hydro and the public.

We must ensure that we have an appropriate legal and institutional framework that can deal with the complex issues that arise in the future and that will ensure we have a more balanced electricity system by the year 2000. The Committee's recommendations address issues in three key areas:

Planning: Informed groups and the general public must have the opportunity for meaningful input.

Evaluation: Resource plans must be thoroughly evaluated in a public forum.

Enforcement: Government policy must be properly enforced.

In short, our planning and decision-making process needs to be more open and more accountable. To accomplish this, the Committee has designed a process that formalizes the development, evaluation and enforcement of resource plans (Exhibit III.4). This section describes how government, Ontario Hydro and the public can work together to deal with the important issues of our electric power system.

1. Resource plans must be thoroughly evaluated.

A decision-making structure that was designed to review the development of the power system on a project-by-project basis is no longer adequate for dealing with the economic, social, environmental and technological issues of this new era of electric power planning. A public review of Ontario Hydro's resource development plan is needed to:

- Involve the public and interest groups earlier in the planning process

- Provide Cabinet with the opportunity to influence the development of the resource development strategy which establishes a framework for individual projects

- Provide Cabinet with an independent and informed evaluation

- Develop consensus in advance of Environmental Assessment hearings
- Provide government and the public with the opportunity to identify and evaluate alternatives before the process has gone past the point of no return

- Provide the opportunity for the Ministry of Energy to appear before a public hearing to outline the energy policy within which Ontario Hydro must operate.

There are, indeed, costs associated with public hearing processes. However, there are substantial costs and unacceptable risks associated with circumventing public hearing processes.

Recommendation 16:

> **The Ontario Energy Board should be empowered to hold bi-annual public reviews of Ontario Hydro's Resource Development Plan, and publish a public report with recommendations to Cabinet.**

The Select Committee found that having structure and clear guidelines for this set of hearings was very helpful in establishing a cooperative atmosphere and in improving the Committee's productivity. Nevertheless, the hearings are only the beginning to a thorough evaluation of Ontario Hydro's planning techniques. The remaining stages of the study are critical to the development of Ontario Hydro's resource development strategy. To continue the work of this Committee, the first public review of Ontario Hydro's planning by the OEB should be focused on the DSOS, after it has been completed. The hearings should take place at least sixty days after Ontario Hydro's report and supporting documents have been published to allow ample time for advance review.

Recommendation 17:

> **The Ontario Energy Board should conduct a public review of the results of Ontario Hydro's demand and supply options study. This review should take place at least sixty days after a final report on the options and all supporting documents have been issued. Recommendations should be made to Cabinet in a public report.**

Clear guidelines should be established for the submission of subsequent resource development plans to clarify the expectations of all parties as to the purpose and content of the public review. It is also critical that the plan and supporting documents be published at least sixty days in advance of the hearings. Information presented at hearings for the first time is unfair to

interested participants as it does not allow them time to analyze the information and provide an informed response.

Recommendation 18:

> **Ontario Hydro's draft resource development plan and supporting documents should be published sixty days in advance of the hearings in a form determined by the Ontario Energy Board.**

Based on its experience with hearings on the demand and supply options study, the Committee suggests the following items be included in Ontario Hydro's resource development plan:

1. Executive Summary: this summary would be a non-technical description of the resource development plan suitable for public distribution and not exceed twenty pages in length.

2. Current status of Ontario's electrical power system: a brief factual overview of system capacity, generating sources used, demand breakdown etc.

3. Evaluation of performance against previous plan: achievements compared to the goals set out in the previous plans

4. Assessment of future electricity needs: demand forecast, description of methodology.

5. Conservation resources: ranking of options, outline evaluation methodology, total potential.

6. Generating resources: review of options available, ranking, potential.

7. Twenty year resource development strategy: the ordering of resources to meet different demand scenarios.

8. Two year action plan: list of planning priorities, timetable for acquiring resources, schedule for data gathering, specific program for conservation and efficiency measures, marketing plans.

9. Environmental scenario: an outline of how the resource development strategy and action plan would differ if environmental protection was the top priority - identify differences in options and cost.

10. Technical appendix: detailed list of critical assumptions, methodologies and analytic techniques used to prepare plan.

Two aspects of the above guidelines are worth specific reference: marketing plans (in the two year action plan) and the environmental scenario.

Marketing Plan

It is Ontario Hydro's intention to continue strategic load growth initiatives until the end of the decade. Concerns have been raised about the problems this approach may create as the surplus disappears in the 1990s, and as Ontario Hydro shifts to a more conservation-oriented approach.

In a properly designed marketing strategy, load growth programs can work in concert with demand reduction programs to benefit the overall system. This can occur because Ontario Hydro has many geographical market segments and diverse customer groups. It is possible to isolate these segments/groups and conduct different marketing strategies to suit each one. However, the Committee is not confident that Ontario Hydro has been able to take such a sophisticated approach to its market.

Here are additional concerns relating to the merit of Ontario Hydro's successful mass marketing programs. Programs such as "Stamp Out Cold Feet" promote the use of electrical resistance space heating which is not always an efficient use of energy for the province. Some programs may increase system efficiency in the short term, but they will eventually advance the need for more generating capacity.

Ontario Hydro has a process for evaluating marketing programs, but the results of these evaluations are not made public. The current marketing

strategy and the evolutions of existing programs must be published for review by the Ministry and detailed marketing strategies must be included in the resource development plan.

Recommendation 19:

> **Ontario Hydro should publish, for review by the Ministry of Energy, a detailed evaluation of all strategic marketing programs including goals, objectives, costs, and benefits.**

Environmental Scenario

Earlier in this Chapter direction was given to Ontario Hydro to develop a resource plan that manages risk by balancing the objectives of low rates, increased flexibility and increased reliability. Controversial social and political considerations such as customer equity, employment, economic stimulation and environmental protection should be decided upon by government and conveyed through policy direction (an example of clear policy direction is the acid gas emission standards).

In many jurisdictions (Northwest and California, for example) conservation has been the dominant choice on an economic basis alone. And there is enough of this resource to defer generating plants indefinitely. This may not be the case in Ontario, and if it is, it is not likely to be forever. To assist the government in its evaluation of the trade-off between economic and environmental objectives, the Committee recommends that:

Recommendation 20:

> **Ontario Hydro should produce, as part of its resource development plan, a scenario where environmental protection would be the top priority. This scenario should identify differences in options and cost from the recommended strategy.**

2. Government policy must properly be enforced.

By instituting a public review of Ontario Hydro's resource development plans, the planning process will be opened up substantially and allow for government and the public to work more closely with Ontario Hydro at an earlier stage in its planning process. The government will have a greater opportunity for input before the options are circumscribed, but it still has very few mechanisms for ensuring that policy directives dealing with planning activities are carried out. To address this problem the Committee recommends that the role of the Ministry of Energy be clarified and the power of the OEB be expanded.

The Memorandum of Understanding is an important document that defines, for everyone to see, the operating relationship between Ontario Hydro and the Ministry of Energy.

The Memorandum of Understanding could play a major role in clarifying the objectives and priorities of Ontario Hydro, and establishing a framework for the resource development plans which are subsequently reviewed in a public hearing. The Ministry should participate actively in those hearings.

Recommendation 21:

> **As the Memorandum of Understanding is an important mechanism for maintaining Ontario Hydro's accountability, it should become a formal legislative requirement.**

In 1973, the Ontario Energy Board Act was amended to include Ontario Hydro. At that time, there was increasing concern over the control of Ontario Hydro in the face of the OPEC crises, increasing costs and the rapid expansion of nuclear energy. There was considerable debate surrounding the options of rate review versus rate regulation. In the end, the Ontario Energy Board (OEB) was given the power of rate review, at the reference of the Minister of Energy.

The rate review process which resulted has left the OEB with no power to enforce government policy and at a disadvantage to Ontario Hydro in carrying out its task of evaluating rates. The primary concern of the Board centres on cost control at Ontario Hydro. Ontario Hydro has, in effect, a "cost-plus" contract with the people of Ontario. If the Board feels costs are getting out of hand, it can only recommend action. The OEB stated its concern about costs in its 1985 review, H.R. 14, but none of its recommendations concerning Ontario Hydro's budget were followed.[41]

A number of other factors limit the effectiveness of the OEB's review of Ontario Hydro's rate increase. They are:

¶ The OEB reviews rates on reference from the Ministry of Energy. As such, the Minister and Ministry officials are precluded from appearing before the Board to discuss the broader policy framework and how rates might fit into that framework.

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41. Exhibit 56, p. 5.

¶ The OEB's reference is limited to the rate for the next calendar year. The OEB, although it receives most major Ontario Hydro public documents, has no authority to monitor the on-going activities of Ontario Hydro, or the industry, in general, as they relate to rates

¶ The OEB faces the same problem with Ontario Hydro's closed planning process that other bodies have - it is very difficult to get information. The OEB determines what information will be made available, but, unlike in reviews of gas rates, the format and content is not determined by the OEB ahead of time.

Rate regulation is an important mechanism for establishing effective public control over Ontario Hydro. It is required to:

- Establish control over Ontario Hydro's costs

- Provide a check against the power of Ontario Hydro's Board of Directors to establish capital budgets, and

- To coordinate the planning and decision-making, linking the critical functions of planning and rate review.

Recommendation 22:

> **The Ontario Energy Board Act should be amended to give the Board the powers to regulate electricity rates.**

Because of the legislative change, the OEB would no longer receive its reference from the Minister of Energy, which would allow the Ministry to

actively participate in the rate hearings. The expansion of the OEB's powers should allow it to have a similar relationship with Ontario Hydro as it does with the gas utilities including:

- Rates are reviewed on an "as need" basis, initiated by an Ontario Hydro application or at the OEB's request

- The Board be allowed to monitor Hydro's planning and operations on an on-going basis

- The Board would determine the format of submissions from Ontario Hydro.

3. Greater public input is required early in the planning process.

The issue of public participation - the need for it and how it should occur - has been a topic covered throughout the reviews of the past 14 years. These reviews clearly established public participation as an essential component of an accountable electric power planning process. The notion of public participation, as it is used here, refers to the activities of and involvement of individuals, both laymen and experts, and special interest groups, rather than the involvement of public agencies. The parties involved with planning issues cover a wide range of public and private organizations and individuals with different interests and motivations.

Public involvement has been made a valuable contribution to the quality of the decision-making process for our electricity system.

> "Few would debate the value of the contribution made in this domain by a variety of public interest groups and individuals . . . a survey of the members of various commissions clearly affirm the substantial improvements to proposals that often result from putting them to the test of public scrutiny and criticism."[42]

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42. S. Shrybman, Canadian Environmental Law Association, Exhibit #67, p. 15.

EXHIBIT III.5

ONTARIO HYDRO PUBLIC INVOLVEMENT PROGRAMS

1. Special Interest Groups
   - Part of demand/supply options study
   - Focus on priorities and values in planning
   - 58 groups, five meetings
   - Invitation only (Ministry and OEB not invited)

2. Regional Consultation
   - Community opinion leaders
   - Invitation only
   - Meetings across province
   - Purpose: increase understanding of demand/supply options

3. Municipal Utilities
   - Managers and commissioners
   - Purpose: increase understanding of demand/supply options

4. Customer Survey
   - Major poll taken (1,600 sample)

5. Communications Programs
   - Advertising
   - Information centres
   - Development of educational materials

There are four levels at which public involvement can occur:

Level	Mechanisms
1. Broad public opinion	- Information dissemination - Public surveys - General feedback
2. Inputs to plans	- Planning forums, discussion sessions - Workshops and committees
3. Review of plans and strategies	- Planning forum and discussion sessions - Hearings
4. Review of individual projects	- Hearings

At the first level of public involvement, Ontario Hydro must be commended for its efforts to open itself to the public. Its communication and public education programs (Exhibit III.5) are valuable tools for the dissemination of information and should be continued. An important purpose of Ontario Hydro's communication programs is to increase the level of understanding of demand and supply options. These programs are important vehicles for informing the public about Ontario Hydro's planning activities. The dissemination of information is a prerequisite for meaningful public participation, but it should not be considered an adequate substitute for public input to the planning process and is not sufficient for building consensus on controversial issues.

At the fourth level of public involvement (project approval), with the Environmental Assessment Act, Ontario has a comprehensive mechanism for ensuring public involvement. However, for the Environmental Assessment process to be an effective planning tool at that stage, two things must occur: there must be plenty of opportunity for public input and discussion of controversial issues throughout the development of plans, and the principles of the Environmental Assessment Act must be applied throughout the planning process.

It is impossible to design mechanisms for public involvement that will please everyone. Nevertheless, improvements can and must be made to Ontario Hydro's programs which appear to be controlled exercises in public relations: controlled because they are by invitation only; and public relations because they are designed primarily to disseminate information about demand and supply options (they occur too late in the process to qualify as participatory).

The forum developed for consulting with special interest groups about the DSOS is a step in the right direction and should be expanded and formalized to become part of the development of Ontario Hydro's resource plan. This forum should become a workshop where important and/or controversial issues are raised and discussed by all interested stakeholders.

The Pollution Probe group must be commended for the introduction of this concept in Ontario with its "Energy Forum '86". Ontario Hydro should conduct an intensive two or three day workshop of this type, seeking the involvement of senior players from the Ministry of Energy, OEB, special interest groups, energy experts, industry representatives, as well as interested individuals. If designed and conducted properly, such a workshop would establish a better atmosphere of cooperation between Ontario Hydro, government and the public, and reduce the probability of conflict in the public hearings.

Recommendation 23:

> **Ontario Hydro should conduct open planning workshops to facilitate full and open discussion of planning issues prior to the finalization and publication of a draft resource plan.**

For the third level of public involvement, the Committee has recommended a public review of Ontario Hydro's resource plan be carried out by the OEB (Recommendation 16). However, the level of public participation at other OEB hearings has been low.

The individual consumer is only modestly affected by electricity rates compared to the many and varied items of his/her budget. The benefits which could be gained from intervening would be far outweighed by the costs of doing so. In the case of electric power planning, the issues are far too long term in nature to be of concern. In either case, the individual has neither the time nor the expertise to defend himself, or herself, properly. There remains a significant imbalance of resources, information and expertise between Ontario Hydro and the ratepayers.

The groups of affected consumers is large and has tremendous potential for political influential. But it is diverse and it remains unattended.

The Ontario Energy Board Act requires that the Board base its determination of the revenue requirement upon the evidence presented to it. If the consumer evidence is not present on the record, it would be inappropriate for the Energy Board to call evidence of its own to create a record. To do so, would turn the Board into an advocate, impairing its impartiality and credibility. However, there exists a significant imbalance of resources, information and expertise between Ontario Hydro and the ratepayers.

The Energy Board may well feel that it protects the consumer interest. But, the fact remains that Hydro's costs for the 1985 rate hearing were $1.5 million.[43]

The only intervenors at last year's rate increase were the Association of Major Power Consumers of Ontario (a lobby group for large industry), Energy Probe, the Ontario Municipal Electric Association and the Ontario Natural Gas Association. Traditionally, there has been little evidence on the record on behalf of the individual consumers who have no large vested interest.

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43. T. Campbell, Ontario Hydro (letter to Select Committee, Apr. 24/86).

The good intentions of the Energy Board should never be held as a substitute for evidence from all perspectives. Two mechanisms for improving the representation of public interests were discussed during the hearings: a consumer energy advocate, and intervenor funding. Insufficient evidence was presented for the Committee to thoroughly evaluate the merits of a consumer advocate for energy matters. However, intervenor funding has been a public policy issue debated in Ontario for many years. The current Government is currently considering this issue.

Because adequate representation of public interests is critical to the success of public hearings on Ontario Hydro's resource plans, the Committee recommends that:

Recommendation 24:

> **The Government should resolve the issue of intervenor funding.**

As Ontario Hydro evolves toward a balanced system, it will become more active on the demand side which, by definition, will bring it closer to the marketplace and its customers. The success of demand programs depends on the cooperation of diverse groups throughout the province including the municipal utilities, energy management firms, contractors, architects, building managers, and so on.

> "In the construction area we see an awful lot of trade ally involvement: close work with builders, developers and electrical contractors. We found that rebate programs necessitate an extremely close working relationship with a trade ally group, which helps leverage the marketing of a program."[44]

Ontario Hydro has been requested to conduct major demonstration projects (Recommendation 10) and develop a comprehensive conservation strategy (Recommendation 9). There are a number of advantages to

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44. T. Davis, SRC, (April 9, N-40, p. 14).

establishing Task Forces of external people to participate actively in these tasks:

- Build wide support for programs

- Ease conflict in hearings

- Assist in data collection

- Assist in marketing and implementation

- Ensure proper design of programs

- Good customer relations

- Valuable mechanism for evaluating and improving programs.

Task Forces should be broad-based. There are many associations and other umbrella groups that would be eager and able participants.

Recommendation 25:

> **Ontario Hydro should establish a special Task Force for each of the residential, commercial and industrial sectors for the explicit purpose of participating in the development and on-going monitoring of a conservation strategy for that sector.**

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4. The term of the Select Committee should be extended to review two critical issues. There are two issues which were raised during the hearings, but were not dealt with in sufficient detail to allow the Committee to develop recommendations. They are:

- Can we improve the representation of the interests of the general public in electric power planning through the establishment of a Consumer Advocate Office?

- What should be the role of the Municipal Utilities in developing and delivering demand-side programs?

Consumer Advocate Office

A consumer advocate office was mentioned as a vehicle for improving the representation of consumer's interests in public hearings related to electric power planning. It could be created to represent consumer interests related to electricity rates and electric power planning before all Regulatory Agencies, Legislative Committees and Government Departments. (The Government may wish to extend this to consumer interests related to other utilities).

There are many viable alternatives for structuring the office. Whatever the option chosen, it should ensure complete independence and freedom from political pressures of any sort, and it should be easily implemented.

The primary functions a Consumer Advocate Office could perform:

1. To receive, process, monitor and respond to consumer concerns related to electricity rates and power planning issues. The office would become a clearing house for consumer concerns in these areas.

2. To take part in any rate, planning or facility hearings on behalf of all consumers and organizations who are unable to offer representation before such Boards.

3. To closely monitor the implementation of orders of Boards, Committees and Government.

4. To monitor the development and implementation of state-of-the-art planning tools and techniques in Ontario.

5. To commission independent advice and studies as needed. This assistance would be limited by the Office's budget which would contain a specific allocation for outside consultants.

Role of municipal utilities.

The municipal utilities are a critical link in the chain of developing and delivering demand-side programs. But, their role remains an ambiguous one. Ontario Hydro's Residential Energy Audit Program was a failure as less than 20 of 320 of the local utilities participated. Why was the participation rate so low? Do the local utilities not support conservation?

Are their interests at variance with those of the province as a whole? How can we make the system work better? These are questions that should be addressed in a subsequent review of the Select Committee.

Recommendation 26:

The term of the Select Committee on Energy should be extended to allow it to review two specific items:

1. **The establishment of a Consumer Advocate as a method of improving the representation of the interests of the general public in hearings related to electric power planning issues.**

2. **The role of Municipal Utilities in facilitating demand-side activities.**

CHAPTER IV

SUMMARY AND CONCLUSION

Diversifying Ontario's resource base must be a priority for the Government and for Ontario Hydro. Diversity is critical to answer the flexibility and reliability of our system. By pursuing a variety of demand and supply options - conservation, hydraulic, cogeneration, municipal solid waste and alternative technologies - we can increase our system's flexibility and manage risk.

This report has made a series of recommendations designed to help the province build a more balanced electric system in the future, one that can deliver power at the lowest economic and social cost to the people of Ontario. There are two main thrusts to the report:

1. Change Ontario Hydro's planning: to ensure that a diverse range of options are considered fairly; and

2. Change the decision-making process: to allow for meaningful public input and to ensure political control over the determination of our electricity future is more effective.

The Committee's plan establishes a clear delineation of responsibilities between Ontario Hydro and the Government. Ontario Hydro must be responsible for the evaluation of all demand and supply options according to the criteria of cost, flexibility and reliability. The Government must be responsible for any changes to the system which are designed to meet environmental, employment or other social objectives. Although Ontario Hydro may play an important role in alternative forms of generation, the responsibility for planning these activities and determining Ontario Hydro's role must lie with the Ministry of Energy.

EXHIBIT IV.1

QUESTIONS RAISED BY ONTARIO HYDRO

Demand Options

1. Should Ontario Hydro influence demand? If so, how? - conservation only? strategic growth only? or both?

2. What criteria should be used to evaluate conservation programs?

3. Should conservation potential be limited by the "no-losers" screening test?

Supply Options

4. Should priority be given to certain supply options? - hydaulic? purchases? parallel generation? alternative technologies?

5. How can approval times be reduced?

Source: Ontario Hydro presentations, Figures 8-2, 8-3

During the hearings, Ontario Hydro requested direction from the Committee on five specific topics (Exhibit IV.1). These questions that Ontario Hydro raised have been addressed throughout the report. The Committee's response to each question appears below.

Hydro Question #1: Should Ontario Hydro influence demand? If so, how - conservation? promotion? or both?

Demand-side options have an important role to play in a balanced electricity system. These options include load shifting, strategic load growth and conservation.

All of these options can be beneficial, depending on the customer segment involved and the situation at hand. A comprehensive marketing strategy must be designed to deal with vast differences in Ontario Hydro's diverse market segments. In some segments, growth in electricity use may benefit the province (e.g., the use of thermo-mechanical pulping in the pulp and paper industry). In other segments, conservation activities are needed to improve efficiency and reduce costs. It would be inappropriate and counterproductive to advocate the use of a single approach to demand management for all situations and at the exclusion of other demand options.

However, while conservation has significant potential as a resource option, it is the least utilized demand option. Accordingly, the Committee has directed Ontario Hydro to give conservation a high priority by developing a comprehensive conservation strategy (Recommendation 9) and taking steps to develop a stronger capability for acquiring conservation resources (Recommendation 10). To ensure that strategic marketing programs contribute to a balanced system, the Committee has recommended they be reviewed and evaluated by both the Ministry of Energy (Recommendation 19) and the Ontario Energy Board (as part of the public review of the resource plan - Recommendation 18).

Hydro question #2: What criteria should be used to evaluate conservation programs?

It is important that demand and supply options be evaluated by a uniform set of criteria. The Committee has given explicit direction to

Ontario Hydro to develop a mix of resource options based on the criteria of cost, flexibility and reliability. To ensure that demand options are treated equally in the planning process, the Committee has recommended the use of planning and forecasting methodologies based on adequate end-use data (Recommendations 5 and 6).

Hydro Question #3: Should conservation potential be limited by the "no-losers" screening test?

Use of the "no-losers" test would contradict the principle of supplying electricity services at the lowest possible cost to society, as it would exclude conservation options that cost less than supply options. Instead of applying the "no-losers" test, Ontario Hydro should develop comprehensive conservation strategies which strive to distribute the benefits of conservation to all customer groups (Recommendation 9).

Hydro Question #4: Should priority be given to certain supply options?

Supply options must be evaluated against the same criteria as demand options. Accordingly, Ontario Hydro should pursue cost-effective options that are flexible and help diversify our resource mix. Hydraulic sites that are accessible and cost-effective should be pursued. Parallel generation (cogeneration, small hydro and municipal solid waste) should also be pursued, but under the parameters established by the Ministry of Energy (Recommendations 13 and 14). Major firm purchase agreements should not be pursued at this time, although it may be advantageous to improve interconnections with Quebec (Recommendation 15) to keep the option open for review in the mid-1990s.

Hydro Question #5: How can approval times be reduced?

The Committee strongly supports the intent of the Environmental Assessment Act. However, the approval process can be improved with a planning process that allows for full and open discussion of key planning issues throughout the development of plans. By broadening Ontario Hydro's base of input to include industry allies and informed public groups (Recommendations 23 and 25) and by exposing the resource plan to a public review (Recommendations 17 to 20) the approval process can be shortened. Public

hearings for individual supply options should be less adversarial as there would have been ample opportunity for building consensus.

DISSENTING OPINION
BY THE
NDP MEMBERS

DARLINGTON DISSENT - NEW DEMOCRATIC PARTY

I Darlington Should Not Proceed

New Democrats do not agree with the Select Committee on Energy's first recommendation to continue with the construction of the Darlington Nuclear Plant.

Not only do we oppose the province's growing and unhealthy over-reliance on nuclear power and the enormous capital investment that has been poured into a single project, but we are troubled by the continuing series of accidents and mechanical failures at different nuclear power plants in Ontario.

This Committee has spent almost a year deliberating the future of electricity in the province while the Liberal government has allowed Hydro to spend almost $2 billion on Darlington. As a result, the Liberal and Conservative members of the Committee have concluded they must uphold the status quo and endorse its continued construction.

This is a position which New Democrats cannot support -- a decision which, in light of the intervening accident at the Chernobyl nuclear plant in Russia, should not be so casually endorsed.

Between the time the Committee began its hearings and now, the world has witnessed the worst nuclear accident in its history. This accident has, understandably, raised the possibility of future nuclear accidents and increased public concern over the safety of nuclear power. The government has not responded to our requests for an independent inquiry by nuclear experts into the safety of Ontario's reactors.

Hydro's reactors have been plagued by accidents and shutdowns in the last two years. Reactors at both Bruce and Pickering have experienced serious pressure tube failures.

The former Select Committee on Hydro Affairs recommended that:

> "The AECB should commission a study to analyze the likelihood and consequences of a catastrophic accident in a Candu reactor. The study should be directed by recognized experts outside the AECB, AECL and Ontario Hydro...If this study is not commissioned by July 31, 1980, the province of Ontario should ensure that it is undertaken."

Now this Committee has been convinced to make a similar recommendation. We urge that the government adopt this recommendation immediately and institute such an inquiry.

We believe the construction of Darlington should be stopped, and that the plant should, at the very least, be mothballed. If the Committee's second recommendation for a safety inquiry is accepted, it makes no sense to continue with Darlington when a safety review may require major modifications to the plant or may even recommend that the nuclear program not proceed.

Although the proposal to stop construction of Darlington may seem like a dramatic move, it is not without precedent. Hydro itself has mothballed heavy water plants

and generating stations in the past at a considerable loss. Certain American utilities have, after careful consideration, mothballed nuclear facilities at or near the point of completion.

We are currently enjoying an enormous surplus of electricity in this province. Surely there is time to pause, to review the safety of the nuclear program, to evaluate the implications of the technical problems and to plan a much more balanced energy future than the one envisioned by Hydro.

II There is a Need to Proceed with Other Options

The Committee has attempted to justify the continuation of Darlington by arguing that Darlington is the most reliable short-term option, but this argument is inconsistent with the findings of the Committee's first report. The first report established the fact that Darlington's power is not even needed until the year 2000 — eight years after it is scheduled to come onto the grid.

This time-frame would allow the government, if it had the political will, to develop and implement the other options for generating electricity. The most viable and most flexible options that the Committee has looked at include small-scale hydro, co-generation and conservation or electrical efficiency. From an environmental standpoint, these options represent far less potentional damage to the environment than either nuclear power plants or their rivals, the coal-fired generating plants.

The completion of Darlington will effectively curtail the need or the incentive for developing more diverse sources of energy. Burdened with an unprecedented surplus of electricity, Ontario Hydro will have no alternative but to market its electricity aggressively.

If it has done anything, the Committee has shown that Ontario Hydro does not have the interest or the commitment to implement the less conventional options. Although many American utilities have implemented ground-breaking new programs to save electricity and avoid the construction of capital-intensive power plants, Hydro has not taken any steps towards exploring similar programs for the province of Ontario.

The Committee has, in fact, identified barriers to the development of alternative electricity supply options that exist in the province. These include the lack of a framework of government policy which would set the stage for the advancement of parallel generation and co-generation, as well as energy efficiency.

However the Committee is confident that the means exist to obtain significant amounts of conservation, co-generation and to develop small hydro projects.

If the potential to develop these options and to estimate their possible contribution to the supply of electricity in the province is not explored, then the province will be left with no choice but to follow Hydro's direction, a direction that will inevitably lead to additional nuclear facilities. Again, while we have a surplus of electricity, we must act to confirm the capacity that exists in the province and to identify our potential to develop alternative sources of electricity.

In times of uncertain demand and growth patterns, flexibility must be the keynote

of power planning.

We need to give Hydro a new direction. The government should wean Hydro away from capital-intensive nuclear power plants. By putting Darlington aside, pressure will be brought to bear on Hydro to develop the other options and to reduce the barriers to bringing them on stream. This strategy would help create a more balanced electricity supply and reduce our overdependence on nuclear.

III Conservation Should not be Entrusted to Hydro

The most striking feature of these hearings was the strong and overwhelming endorsement of conservation by many of the witnesses. Conservation, as it was defined for the Committee, meant not getting by on less but making improvements in the way in which electricity is used. For example, improving the efficiency of the way in which energy is used for such functions as refrigeration, lighting or process heat frees up existing supplies of energy for other uses and avoids the need to build new generating facilities.

The conservation option has many significant advantages over nuclear power — flexibility, scale and lead time. Conservation allows the utility to plan much more precisely for increased electricity use because it reduces the uncertainty.

We believe that conservation is vital to this province and must be thoroughly explored. However, we do not agree with the Committee's recommendation that Hydro should be the given mandate to pursue conservation.

Hydro has shown considerable reluctance to pursue conservation. It has not developed the expertise, nor the experience in orchestrating conservation programs. Hydro's past record in this area has been a dismal failure.

In fact, Hydro has a conflict of interest in this regard. As we have shown, there is an unprecedented surplus of electricity in the province. If a large part of this electricity is not used, then the cost of electricity to the consumer becomes more expensive. As part of its mandate to supply electricity at the lowest possible price, Hydro tries to ensure that as much electricity as possible is consumed. Therefore, Hydro would find it inherently difficult to encourage its consumers to use less.

The other compelling reason why Hydro should not be responsible for conservation is because conservation should be applied not just to electricity but to all forms of energy. Hydro manages the electrical supply system which only constitutes 17% of the province's energy needs.

We believe that an independent agency should be created to implement conservation strategies.

An independent agency would be able to direct the development of conservation strategies. It would give the province a leadership role in the promotion of conservation and the implementation of Canadian technologies.

Moreover, a conservation agency could create thousands of jobs. According to witnesses before the Committee, $4 billion invested over 15 years in the retrofitting of houses would create around 9,500 to 10,000 jobs during that period. A 15-year program to reduce energy consumption of commercial buildings by 40 per cent could be achieved with an investment of only $2.5 billion and would create roughly 4,000 jobs.

It is our contention that the $4 billion that could be saved if Darlington were stopped now would be far better spent on conservation and would produce a much higher number of long-term jobs.

Nevertheless, no matter what agency is chosen by the government to deliver conservation, we believe that it is absolutely essential that conservation strategies be developed and implemented in this province. If the government is not prepared to set up an independent agency, then they must explicitly direct Hydro in these matters. In terms of innovative projects and the exploration of conservation techniques this province has lost ground to other jurisdictions who long ago recognized the value of making the most of their resources.

IV Hydro Projects Should Not be Exempted Again From Environmental Assessment

Lastly, the recommendations of the Committee attempt to put the public back into planning the province's electrical future. By and large, we support many of these recommendations. It has long been our view that Ontario Hydro must be made more accountable to the Legislature and to the public. We also agree that the regulatory regime must be strengthened to ensure that Hydro's plans are routinely and thoroughly scrutinized, and that the public has the opportunity to affect Hydro's plans much earlier in the planning stages.

However, there is one obvious omission. We feel that any future plans developed by Hydro must be subject to environmental assessment. Hydro avoided such scrutiny and public objections by arguing that the need for Darlington was so urgent they must be exempted. This was not acceptable to us then and it is not acceptable now.

The Environmental Assessment Act was introduced as a planning tool. It gave the public opportunities to present alternatives and to refine the plans, all of which has been denied when these projects are exempted. In future, Hydro must not be given any exemptions from the Environmental Assessment Act.

Brian Charlton Ruth Grier

OPSEU: 593

NOTES

<u>1. The Committee's first report, "Report on Darlington Nuclear Generating Station", contained the following recommendations:</u>

¶ Without limiting the broad scope of the Committee as set out in its terms of reference, the Committee should give priority to an examination of the relationship between the Government of Ontario and Ontario Hydro for the purposes of clarifying the relationship, setting out the specific responsibilities of each and defining the mechanisms that can activate the responsibilities

¶ The Committee should undertake an independent review of the Ontario Hydro demand/supply options study backed by such expertise as may be required to illuminate specific and critical issues embodied in it

¶ No further significant contracts for units three and four should be let for materials not required for construction during the next six months while the committee studies demand and supply options.

<u>2. The electricity industry has been a major area of investment</u>: $10.5 billion has been spent by Ontario Hydro just on nuclear generation facilities since 1977, compared to $9.1 billion in agriculture and fishing, $6.7 billion in primary metals and steel-making, $6.1 billion in automobile manufacturing and $4.3 billion in mining over the same period (Source: Ontario Hydro and Statistics Canada).

<u>3. The demand for electricity is a "derived" demand</u>. It is not demanded for itself, but for the services which it can provide - for the comfort it can offer in heating and cooling our residential, commercial and industrial space, for the motive power it provides in turning motors to

manufacture goods and services, for heating industrial processes, for light, and so on.

From the society's perspective, it makes little difference what form of energy provides the service or how technically efficient the end-use device is, as long as the overall cost of obtaining the energy service (heat, light, motive power, etc.) can be minimized. Therefore, electricity must be viewed as only one of many options to meet customer demands.

4. Options - A Flexible Approach For Generating Resources. If the Pacific Northwest grows rapidly, it will need resources in addition to conservation. The Council has been working to improve the flexibility of generating resources in order to reduce the risk they pose for utility systems and ratepayers. A new arrangement, which first appeared in the 1983 plan, uses resource "options" to add flexibility to the scheduling of those resources which require a great deal of time from inception to completion.

An option would allow a resource to move through the time consuming, but relatively inexpensive siting, design and licensing stages after which it can be placed in a "ready condition." In that condition, the project could be scheduled, placed on hold, constructed or terminated, depending on the demand for electricity. To acquire an option, the Bonneville Power Administration would provide financial assistance to a resource sponsor in exchange for the right to decide when conditions warrant beginning construction. Such options would provide a relatively low-cost inventory that would allow the region to be ready for high growth rates without prematurely committing to build to those rates.

By having a licensed or readily licensable resource effectively "on hold". the period over which electricity needs must be forecast is reduced to the resource construction period, which may be as little as half of the total time that is now needed. The cost of developing options is relatively small compared to the costs associated with constructing a resource. Figure 3-1 shows the cumulative costs of the option and construction phases for several resources. For example, the total lead time to site, license, design and construct a new coal plant is about ten years. The activities of siting, licensing and detailed design would take five years and cost $60 per kilowatt,

compared to the $1,200 per kilowatt for the construction phase. It would then take another five years to complete construction.

The key to the options concept is the separation of decisions related to construction from those of preconstruction. The objective of an effective options planning strategy is to move decisions involving the commitment of large sums of capital as close as possible to the anticipated time power will be needed. This will significantly reduce the likelihood of beginning construction on a project that is not needed. Another benefit of the option approach is its potential for reducing environmental degradation. For example, if generating plant construction can be postponed until need is more certain, the accompanying environmental impacts also can be postponed or avoided.

The Council has planned a large inventory of options to meet a very high level of economic growth. If the region actually experiences lower growth rates, some options would be delayed or even abandoned at a minimum cost to the region. This concept is comparable to an insurance premium. It allows the region to match energy supply to actual demand and reduces the chance of overbuilding resources, an event which as historically has been very costly.

5. Reviews of Ontario's electricity rate structure. From 1977 to 1979 the Ontario Energy Board reviewed Ontario Hydro's rate structure. This review, referred to as the Marginal Cost Pricing Review or the Electricity Costing and Pricing Review, culminated in a report, H.R. 5. Ontario Hydro's response to the recommendations of H.R. 5 were reviewed by the Ontario Energy Board in 1982 (see H.R. 11).

6. In California and the Northwest policy groups play a very active role in the development of a policy framework for the electricity power planning process.

California

The State Public Resources Code, section 25309, requires the California Energy Commission to submit to the Governor and the Legislature a bi-annual

energy plan. This plan must contain a 20 year projection of energy needs, and a 12-year plan for meeting electric power demand consistent with economic and environmental goals.

Northwest

The U.S. Congress authorized the creation of the eight-member Council in 1980 when it passed the Northwest Power Act (PL 96-501). Subsequently, the legislatures of Idaho, Montana, Oregon and Washington voted to form the Council, and the four state governors appointed two members from each state to serve on it.

Congress required the Council to determine how much energy the region would need over the next 20 years and to develop an electrical power plan to meet those needs.

The Council's 20-year Northwest Power Plan serves as a blueprint for ensuring that the region has adequate and reliable electrical power to meet the needs of a growing economy at the lowest possible cost. This plan gives priority to energy conservation because Congress required that the most cost-effective resources be used first.

APPENDICES

A. Committee Agenda

B. List of Witnesses

C. List of Exhibits

D. List of Public/Interest Groups That Sent Written Briefs

E. Compendium of Conservation Programs

F. Past Reviews of Ontario Hydro And Electric Power Planning

G. Ontario Hydro's Demand And Supply Options Study

H. The Hidden Costs of Electricity Options in Ontario
(Excerpts from Exhibit 57)

APPENDIX A

COMMITTEE AGENDA

Tuesday, April 1, 1986

9:30 a.m.	INTRODUCTION Brent Snell Consultant to Committee
9:45 a.m.	Introduction to Utility Planning Ralph Cavanagh Natural Resources Defence Council
1:30 p.m.	State of Utility Planning David Jones Temple, Barker and Sloane

Wednesday, April 2, 1986

9:30 a.m.	Ontario Hydro (Presentation)
2:00 p.m.	Ontario Hydro (Presentation)

Thursday, April 3, 1986

9:30 a.m.	Ontario Hydro (Presentation)
2:00 p.m.	Ontario Hydro (Presentation)

Friday, April 4, 1986

9:30 a.m.	Don Robinson Ashley - Robinson Management Services
10:15 a.m.	John Robinson University of Waterloo
11:00 a.m.	Terry Burrell Victor and Burrell Associates
1:30 p.m.	Ralph Torrie

<u>Wednesday, April 9, 1986</u>

9:30 a.m.	Todd Davis Synergic Resources Corporation
11:00 a.m.	Art Rosenfeld Lawrence Berkeley Laboratory
2:00 p.m.	John Robinson Ralph Torrie
3:30 p.m.	David Brooks Marbek Consultants

Thursday, April 10, 1986

9:30 a.m.	Allen Levy Rose Technology
	Gord Graham Blake, Cassels and Graydon
	Frank Dixon Consumers' Gas
11:00 a.m.	Mike Dupuis Small Hydro Operator
2:00 p.m.	Peter Miller Efficiency Standards
3:30 p.m.	Bob Tamblyn Tom Tamblyn Engineering Interface

Friday, April 11, 1986

9:30 a.m.	CNA/AECL Panel
11:00 a.m.	Joint Industry Task Force
2:00 p.m.	Colin Isaacs Energy Forum '86

Monday, April 14, 1986

9:30 a.m.	Robert W. Macaulay, Q.C. Chairman, Ontario Energy Board
10:30 a.m.	Mike Berkowitz Economics Department University of Toronto
1:30 p.m.	Ken Linder I.C.F. Inc.

Tuesday, April 15, 1986

9:30 a.m.	The Honourable Vince Kerrio, M.P.P. Minister of Energy Duncan Allan Deputy Minister of Energy Bruce MacOdrum Assistant Deputy Minister Ministry of Energy
1:30 p.m.	Jon Wellinghoff Nevada's Office of Consumer Advocate
3:15 p.m.	Paul Markowitz Critical Mass Energy Project

Wednesday, April 16, 1986

9:30 a.m.	Roy Hemingway Northwest Power Planning Council
11:00 a.m.	Steve Hickok Bonneville Power Administration
2:00 p.m.	Ontario Natural Gas Association
3:15 p.m.	Energy Probe

Thursday, April 17, 1986

9:30 a.m.	Steve Schrybman Canadian Environmental Law Association
12:00 Noon	*In camera* session for Committee

Friday, April 18, 1986

9:30 a.m.	Ontario Hydro

APPENDIX B

LIST OF WITNESSES

Mr. J. Aiken
Chairman, Senior Vice-President,
Accounting and Regulations
Conumers' Gas Company Ltd.
Ontario Natural Gas Association
Toronto, Ontario

Mr. Duncan M. Allen
Deputy Minister of Energy
Province of Ontario

Mr. D. Armour
President, EEMAC
Joint Industry Panel No. 1

Mr. David Argue
Senior Associate
Passmore Associates International Inc.
Ottawa, Ontario

Professor Mike Berkowitz
University of Toronto, and
M.K. Berkowitz & Associates Ltd.
Toronto, Ontario

Mr. D. Brooks
Director, Marbek Resource Consultants Ltd.
Ottawa, Ontario

Mr. J. Brooks
Pollution Probe Foundation
"Energy Forum' 86"
Toronto, Ontario

Mr. Terrence N. Burrell
Victor & Burrell Research and Consulting
Toronto, Ontario

Mr. Tom Campbell
Chairman
Ontario, Hydro

Mr. Ralph Cavanagh
Director, Energy Products
Natural Resources Defence Council
San Francisco, California

Mr. T. Davis
Vice-President, Marketing and Evaluation
Synergic Resources Corporation
Bala Cynwyd, PA.

Mr. F. Dixon
Vice-President, Consumers' Gas
Rose Technology Group
Toronto, Ontario

Mr. George Dominy
Manager, Finance, Rates and Utilization
Ministry of Energy
Province of Ontario

Mr. R. Donavan
President, Babcock & Wilcox Canada

Mr. Mike Dupuis
Galetta Power Company
Arnprior, Ontario

Mr. R.A. Fleming
Supervising Planner, Demand Planning and
Bes-Resources Planning
Ontario Hydro

Mr. Robert Franklin
President
Ontario Hydro

Mr. J. Gardiner
Vice-President
Acres International
Joint Industry, Panel.No. 2

Mrs. R. Gillespie
Executive Vice-President, CGE
Joint Industry Panel No. 1

Mr. G. Graham
Lawyer, Blake, Cassels & Graydon
Rose Technology Group
Toronto, Ontario

Mr. S. Hall
Pollution Probe Foundation
"Energy Forum' 86"
Toronto, Ontario

Mr. Roy Hemingway
Ex-Commissioner
Northwest Power Planning Council
Portland, Oregon

Mr. Steven G. Hickok
Assistant Administrator, Conservation
Bonneville Power Administration
Portland, Oregon

Mr. Art Hill
Director, Systems Planning
Ontario Hydro

Mr. Sam Horton
Executive Vice-President,
Engineering and Services
Ontario Hydro

Mr. Robert J. Howe
Association Counsel, With Aird & Berlis
Ontario Natural Gas Association
Toronto, Ontario

Mr. C. Isaacs
Pollution Probe Foundation
"Energy Forum' 86"
Toronto, Ontario

Mr. Jack Johnson
Director of Legal Services, Ministry of Energy
Province of Ontario

Mr. David Jones
Principal
Temple, Barker & Sloane Inc.
Lexington, Massachusetts

The Honourable Vince Kerrio, M.P.P.
Minister of Energy for the Province of Ontario

Mr. D. Lawson
President, Candu Operations, AECL.
Joint Industry Panel No. 2

Mr. A. Levy
Rose Techonology Group Ltd.
Toronto, Ontario

Mr. J. Lind
Chairman, AMPCO
Joint Industry Panel No. 1

Mr. Kenneth Linder
Vice-President, ICF Incorporated
Washingotn, D.C.

Mr. Richard Lundeen
Director of Operations, Ministry of Energy
Province of Ontario

Mr. Robert W. Macaulay, Q.C.
Chairman
Ontario Energy Probe
Toronto, Ontario

Ms Claudette Mackay-Lassonde
Manager, Load Forecasts Department
Ontario Hydro

Mr. Paul Markowitz
Policy Analyst, Critical Mass Energy Project
Washington, D.C.

Mr. Bruce MacOdrum
Assistant Deputy Minister of Energy
Province of Ontario

Mr. W. MacOwan
Vice-President, Howden Parsons
Joint Industry, Panel No. 2

Mr. E.A. Marriage
Manager, Bes-Resources Planning
Ontario Hydro

Mr. Lorne McConnell
Vice-President, Power System Programme
Ontario Hydro

Mr. G.N. Meehan
Senior Engineer, Electricity Transportations
Bes-Resources Planning
Ontario Hydro

Mr. P. Miller
Private Cosultant on
Energy Policy and Conservation
Washington, D.C.

Mr. Arvo Nittenberg
Executive Vice-President, Operations
Ontario Hydro

Mr. J.R. O'Connor
Director, Public Relations Division
Ontario Hydro

Mr. H.C. Palmer
Director, Market Services and Development
Ontario Hydro

Mr. W.J. Penn
Programme Manager, Planning and Engineering
Management Design and Development Division
Generation
Ontario Hydro

Mr. Paul E. Pinnington
Managing Director
Ontario Natural Gas Association
Toronto, Ontario

Mr. David Poch
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Energy Probe Research Foundation
Toronto, Ontario

Mr. Don J. Robinson
President, Ashley-Robinson
Management Services Inc.
Glen Williams, Ontario

Dr. John B. Robinson
Associate Professor, Department of Man-Environment
Studies, and Director, Waterloo Simulation
Research Facilities
Waterloo, Ontario

Professor A. Rosenfeld
Leader - Energy Efficient Building
Research Program
Lawrence Berkeley Laboratories (U.S. Dept. of Energy)
University of California (Berkeley)

Mr. Mitch Rothman
Chief Economist
Ontario Hydro

Mr. Norman Rubin
Director, Nuclear Research
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Mr. Steve Schrybman
Canadian Environmental Law Association
Toronto, Ontario

Mr. Amir Shalaby
Supervising Engineer, Supply Planning
Bes-Resources Planning
Ontario Hydro

Mr. Paul Shervill
Manager, Electricity Section, Ministry of Energy
Province of Ontario

Mr. Ken Snelson
Assistant to the Director,
Systems Planning
Ontario Hydro

Mr. G. Steel
Consulting Engineers of Ontario
Joint Industry Panel No. 1

Mr. Bob Tamblyn
Engineering Interface Limited
Willowdale, Ontario

Mr. Tom Tamblyn
Engineering Interface Limited
Willowdale, Ontario

Mr. Ralph Torrie
Research Analyst
Energy Research Group
Ottawa, Ontario

Mr. John Wellinghoff
Consumer Advocate for the State of Nevada
Reno, Nevada

APPENDIX C

LIST OF EXHIBITS

SELECT COMMITTEE ON ENERGY

EXHIBIT LIST PHASE II

ONTARIO HYDRO

Exhibit No. 1.	Written submission from Ontario Mining Association by Patrick Reid, dated February 27, 1986.
Exhibit No. 2.	Written submission from Ontario Institute of Agrologists by D.A. McArthur, dated February 26, 1986.
Exhibit No. 3.	Written submission from the Ontario Chamber of Commerce, by B.R. Willson, dated February 27, 1986.
Exhibit No. 4.	Written submission from Electrical and Electronic Manufacturers Association of Canada by Sundar Raj, dated March 3, 1986.
Exhibit No. 5.	Written submission from Canadian Electrical Association by Wallace S. Read, dated February 28, 1986.
Exhibit No. 6.	Written submission from Ontario Federation of Labour by John Eleen, dated February 27, 1986.
Exhibit No. 7.	Written submission by T.B. Lounsbury, dated February 26, 1986.
Exhibit No. 8.	Written submission from The United Church of Canada, dated February 28, 1986.
Exhibit No. 9.	Written submission prepared by the Joint Industry Task Force, dated February, 1986.
Exhibit No. 10.	Written submission from Taskforce on the Churches and Corporate Responsibility by David Hallman, dated February 24, 1986.
Exhibit No. 11.	Brief to the "Interfaith Hearings on Nuclear Issues" prepared by Taskforce on the Churches and Corporate Responsibility.
Exhibit No. 12.	Written submission from Atomic Energy Control Board, dated January 15, 1986.
Exhibit No. 13.	Written submission from the Conservation Renewable Energy Industry Council, by Brian Kelly, and Jeffrey Passmore.
Exhibit No. 14.	Written submission from Energy Probe by Norman Rubin dated February 26, 1986.

EXHIBIT LIST PHASE II

(Continued)

ONTARIO HYDRO

Exhibit No. 15.	Written submission from Nishnawbe-Aski Nation by Meish M. Podlog, dated February 26, 1986.
Exhibit No. 16.	Consumers' Association of Canada (Ontario) Written submission.
Exhibit No. 17.	Ontario Federation of Labour Written submission.
Exhibit No. 18.	Municipal Electric Association Written submission.
Exhibit No. 19.	Ontario Hydro From the Foodland Hydro Committee Written submission.
Exhibit No. 20.	Ralph Cavanagh - Submission to the Select Committee on Energy, entitled "The least-cost Planning Imperative for Electric Utilities and their Regulators".
Exhibit No. 21.	Don J. Robinson - Paper entitled "Review of Ontario Hydro's Demand and Supply Options Study".
Exhibit No. 22.	Ontario Hydro Report Demand and Supply Options Study - The Options.
Exhibit No. 23.	Ontario Hydro Report Design and Development Division - Generation Review of Generation Options.
Exhibit No. 24.	First Edition Summary, dated March 1986, of Recommendations/Concerns expressed within briefs submitted to the Select Committee on Energy with respect to Demand and Supply Options for Electricity, prepared by Jerry Richmond and Beth Ward, Research Officers. Legislative Research Service - Background Report, dated March 19, 1986, to the Select Committee on Energy on the Option of Ontario Purchasing Firm Power from Quebec and/or Manitoba.
Exhibit No. 25.	Brief to the Select Committee, Communications and Consultation Programs for the Demand/Supply Options Study, prepared by Corporate Relations Department, Ontario Hydro.

Exhibit No. 26.	Brief to the Select Committee on Energy, submitted by the Canadian Nuclear Society, dated March, 1986.
Exhibit No. 27.	Ontario Hydro - Document with respect to an overview of the Demand/Supply Options Study.
Exhibit No. 28.	Ontario Hydro - Document entitled "Bulk Electricity System Perspective and Evaluation Criteria" (4A - Electricity and the Electrical Power System; 4B - Load Forecasts; 4C - Load and Capacity Comparison; 4D - Evaluation Criteria and Standard Costs).
Exhibit No. 29.	Ontario Hydro - Submission to the Select Committee on Energy on Demand Management Options (5A - Demand Management and its Application to Resource Planning; 5B - Demand Management and Load Forecast; 5C - Demand Management Activities; 5D - Demand Management Potential; 5E - Demand Issues).
Exhibit No. 30.	Ontario Hydro - Submission to the Select Committee on Energy on Supply Options (6A - Review of Supply Options; 6B - Electricity Purchases from Manitoba and Quebec; 6C - Independent Generation of Electricity in Ontario; 6D - Hydrolic Development Programme; 6E - Alternative Technologies; 6F - Supply Issues).
Exhibit No. 31.	Ontario Hydro - Submission to the Select Committee on Energy on Public Consultation and Public Issues (7A - Consultation and Communications Programmes; 7B - Public Issues).
Exhibit No. 32.	Ontario Hydro - Submission to the Select Committee on Energy entitled "Overview of the Issues").
Exhibit No. 33.	Don Robinson - Submission entitled "Summary of DSOS Study".
Exhibit No. 34.	Ontario Hydro - Letter dated March 17, 1986, from Patrick J. Lavelle, Deputy Minister of the Ministry of Industry, Trade and Technology, to Tom Campbell, Chairman of the Board of Ontario Hydro.
Exhibit No. 35.	Select Committee on Energy - Discussion paper, dated March 24, 1986, entitled - "Choosing Demand and Supply Options - Electric Power Planning in Ontario" and prepared for the Select Committee on Energy by the Committee staff.

Exhibit No. 36.	Legislative Research Service - Document dated April 2, 1986, entitled "Supplementary information on Quebec Purchase Option: Highlights on Hydro-Quebec Development Plan 1986-1988 - Horizon 1995", prepared by Jerry Richmond, Research Officer.
Exhibit No. 37.	Synergic Resources Corporation - Submission to the Select Committee on Energy, on Demand Management.
Exhibit No. 38.	Lawrence Berkeley Laboratories - University of California - Submission to the Select Committee on Energy, on Demand Management.
Exhibit No. 39.	Harvard Business Review - Article in the July/August 1985, issue entitled "Transformed utilities: more power to you", by John C. Sawhill and Lester P. Silverman; submitted by Mr. Ray Haggerty, M.P.P.
Exhibit No. 40.	The Economist - Articles in the March 29, 1986, issue entitled "Nuclear's charm", "Gulf of assertion", and "Science and Technology - A small, safe and simple future for nuclear reactors"; prepared by Mr. B. Snell, Consultant to the Committee.
Exhibit No. 41.	Second Edition Summary, dated April, 1986, of Major Viewpoints, Recommendations and Concerns expresses Within Briefs Submitted to Select Committee on Energy Re Demand and Supply Options for Electricity, prepared by Jerry Richmond and Beth Ward, Research Officers.
Exhibit No. 42.	Ralph Torrie - Submission to the Select Committee on Energy dated April 4, 1986 on Demand Management.
Exhibit No. 43.	Marbeck Resource Consultants Ltd. - Submission to the Select Committee on Energy, dated April 9, 1986 on Demand Management.
Exhibit No. 44.	Energy Futures, April 4, 1986, "Manitoba to Export More Power", prepared by Jerry Richmond, Research Officer.
Exhibit No. 45.	Rose Technology Group - Submission by Mr. F.O. Dixon dated April, 1986 to the Select Committee on Energy.
Exhibit No. 46.	Galetta Power Limited - Submission by Mr. Mike Dupuis dated April 10, 1986 to the Select Committee on Energy.
Exhibit No. 47.	Passmore Associates International - Submission by Mr. David Argue, Senior Associate, dated April 10, 1986 to the Select Committee on Energy.
Exhibit No. 48.	Peter Miller - Submission to the Select Committee on Energy dated April 10, 1986 on Appliance and Building Standards.

Exhibit No. 49.	Written submission from the Ontario Cattlemen's Association respecting Ontario's future electrical energy needs, dated March, 1986.
Exhibit No. 50.	Written submission from Mr. Gaston Delisle, President, Elliot Lake and District Chamber of Commerce dated March 27, 1986.
Exhibit No. 51.	Engineering Interface Limited - Submission to the Select Committee on Energy dated April 10, 1986.
Exhibit No. 52.	Joint Industry Panel No. 1, Chaired by Mr. R. Gillespie Submission to the Select Committee on Energy, dated April 11, 1986.
Exhibit No. 53.	Joint Industry Panel No. 2, Chaired by Mr. R. E. Donovan - Submission to the Select Committee on Energy dated April 11, 1986.
Exhibit No. 54.	The Pollution Probe Foundation - Submission to the Select Committee on Energy on Energy on Demand and Supply Options, dated April 11, 1986.
Exhibit No. 55.	Summary of Workshop Proceedings - Energy Forum '86, Pollution Probe Foundation, Toronto, February 26-28, 1986.
Exhibit Nos. 56, and 56A.	Ontario Energy Board - Submission by Mr. R.W. Macauley, Q.C., Chairman, to the Select Committee on Energy, dated April 14, 1986; letter dated April 11, 1985 from the Minister of Energy to the Ontario Energy Board Chairman.
Exhibit Nos. 57, and 57A.	M.K. Berkowitz and Associates Ltd. - Submissions entitled "The Hidden Costs of Electricity Options in Ontario".
Exhibit No. 58.	Kenneth P. Linder, ICF Incorporated - Submission to the Select Committee on Energy entitled "U.S. Government and Regulatory Commission Activities in Electric Utility Planning", April 14, 1986.
Exhibit No. 59.	Ministry of Energy - Submission to the Select Committee on Energy, dated April 15, 1986.
Exhibit No. 60.	Paul Markowitz, Policy Analyst, Public Citizen's Critical Mass Energy Project - Submission to the Select Committee on Energy entitled "A Model State Least-Cost Electrical Policy", April 15, 1986.
Exhibit Nos. 61. and 61A.	Northwest Power Planning Council - Submission by Mr. Roy Hemingway, Ex-Commissioner, to the Select Committee on Energy, April 16, 1986.
Exhibit No. 62.	Bonneville Power Administration - Submission by Mr. Steven G. Hickok, Assistant Administrator, Conservation, to the Select Committee on Energy dated, April 16, 1986.

Exhibit No. 63.	The Ontario Natural Gas Association - Submission to the Select Committee on Energy, April 16, 1986.
Exhibit No. 64.	Ontario Cattlemen's Association - Written submission to the Select Committee on Energy, dated March, 1986.
Exhibit No. 65.	The North Shore Development Association - Written submission to the Select Committee on Energy from the Chairman entitled "Review of Elliot Lake's Uranium Supply Contract with Ontario Hydro".
Exhibit No. 66.	Algocen Realty Holdings Limited - Written submission from Mr. J.C. Willey, General Manager, Algo Centre - Algo Inn, Elliot Lake, dated March 19, 1986.
Exhibit Nos. 67, 67A, & B	Canadian Environmental Law Association - Submissions by Mr. Steve Shrybman, Association lawyer, to the Select Committee on Energy, dated April 17, 1986.
Exhibit No. 68, 68A & B	Energy Probe Research Foundation - Submissions by Mr. David Poch, Counsel and Mr. Norman Rubin, Director, Nuclear Research, to the Select Committee on Energy, April 16, 1986.
Exhibit No. 69.	Ontario Hydro - Document from the Economics and Forecasts Division, dated December 20, 1985, entitled "Barriers to Strategic Conservation".
Exhibit No. 70.	Ontario Hydro - Document entitled "Chronology of Key Events Leading to Current Status on Transmission Line Projects", dated April, 1986.
Exhibit No. 71.	Various reference documents. See list entitled "Background Documents".
Exhibit No. 72,	Ontario Hydro - Submissions ot the Select Committee on Energy: Exhibit No. 72 - "Section 9, Response to Others"; Exhibit No. 72A - "Section 10, Darlington"; Exhibit No. 72B - "Section 11, Demand/Supply Options Study Review"; Exhibit No. 72C - "Section 12, Closing Remarks".
Exhibit No. 73.	Ontario Hydro - Submission to the Select Committee on Energy entitled "Response to the April 11, 1986 Request of the Select Committee on Energy Re Marketing Program", April 18, 1986.
Exhibit No. 74.	Legislative Research Service - Background Report, dated April 29, 1986 entitled "Collection of Recent Press Clippings" prepared by Jerry Richmond, Research Officer.

Exhibit No. 75.	Written Submission from Canadian Energy Research Institute dated April 18, 1986.
Exhibit No. 76.	Legislative Research Service - Background Report, dated May 1, 1986 entitled "Compendium of Amendments to The Power Commission (Corporation) Act Since 1970."
Exhibit No. 77.	Written Submission from Toronto Nuclear Awareness dated April 15, 1986.
Exhibit No. 78.	Written Submission from Association of Mining Municipalities of Ontario dated April 15, 1986.
Exhibit No. 79.	Legislative Research Service - Background Report entitled "Summary of Major Viewpoints, Recommendations and Concerns" Third Edition by Jerry Richmond and Beth Ward, Research Officers.

Exhibit No. 71

Background Documents

B-1. Royal Commission on Electric Power Planning, The Report of the Royal Commission on Electric Power Planning, Volums 1-9, February 1980, Ontario.

B-2. Task Force Hydro, Report Number One, August 15, 1972, through to Report Number Five, June 29, 1973, inclusive.

B-3. Ontario Energy Board, Report of the Board H.R. 14.

B-4. Select Committee of the Legislature Investigating Ontario Hydro, A New Public Policy Direction for Ontario Hydro, June 1976.

B-5. Bott, Robert, "Power Failure", Canadian Business, January 1984.

B-6. Electric Power Research Institute, (EPRI), Alternative Power Generation Options, December 1985.

B-7. EPRI, Demand-side Management, Volume 1: Overview of Key Issues. EA/EM-3597, August 1984 (1984-E).

B-8. EPRI, Demand-side Management, Volume 2: Evaluation of Alternatives.

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B-10. EPRI, Conference on Utility Conservation Program; Planning, Analysis, and Implementation, WA-3530, May 1984. (1984-B).

B-11. EPRI, Electric Utility Conservation Program: Assessment of Implementation Experience, EA-3585, (1984-C).

B-12. EPRI, Measuring the Impact of Residential Conservation, Volume 1: An Econometric Analysis of National Data, EA-3060, July 1985 (1985-A).

B-13. EPRI, Selected Paper on Demand-side Management, June 1985 (1985-A).

B-14. EPRI, Setting Objectives for Demand-side Management, Topic Report 1, EA-4220, August, 1985 (1985-B).

B-15. Hill, L.J., and Hirst, Demand-side Management: Research Opportunities for Electric Utilities, Electric Power Systems Research, 1984/85).

B-16. Hirst, Eric, Household Energy Conservation: A Review of the Federal Residential Conservation Service, Public Administration Review, September/October, 1984.

B-17. Hirst, Eric, "Is improved energy efficiency still an important policy issue?" Energy Policy, April, 1985.

B-18. Hirst, Eric, "Measuring the benefits and cost of utility conservation and load management programs, Energy Policy June 1984.

B-19. Hirst and Goeltz, "The Economics of Utility Energy Conservation Programs: A Pacific Northwest Example", The Energy Journal, Vol. 5, No. 3.

B-20. Hirst and Goeltz, "Residential Energy Conservation", Ashrae Journal, January 1984.

B-21. Hooker, C.A. and R. Van Hulst, Institutions, Counter-institutions and the Conceptual Framework of Energy Policy-making in Ontario, Prepared for the RCEPP, May 1977.

B-22. ICF Inc, Least-cost Utility Planning, submitted to Edison Electric Insitute, October 1985.

B-23. Marbek, Final Report: A Collection of Second Generation Energy Conservation Programs, November 1983.

B-24. Markowitz, Paul and J. Kriesberg, Least-cost Electrical Planning: Is There Really a State Movement?, Critical Mass Energy Project, December 1985.

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B-26. Michigan Department of Commerce, Study Guide: Michigan Electricity Options Study, January 1986, Lansing, Michigan.

B-27. Northwest Power Planning Council, Northwest Conservation and Electric Power Plan: Meeting the Regions Electrical Energy Needs at the Lowest Cost, 1985, (draft), Portland, Oregon.

B-28. Northwest Power Planning Council, Northwest Energy News, Vol. 4, No. 4, August/September 1985.

B-29. Oak Ridge National Laboratory, Electricity Utility Demand-Side Programs and Integrated Resource Planning: Visits to 10 Utilities, November 15, 1985, Oak Ridge, Tennessee.

B-30. Ontario Hydro, Demand-side Management Actitivites, 1983-Present.

B-31. Ontario Hydro, Developing A Load Management Strategy for Ontario, Part 1, Load Management Department, December 1982.

B-32. Ontario Hydro, Meeting Future Needs: An Initial review of the Options, Report 651SP, November 1985.

B-33. Ontario Hydro, Update On Load Management Reports, including letter, report on water heaters and a list of reports available.

B-34. Ontario Ministry of Energy, Fuelling Ontario's Future-energy 2000, September 1985.

B-35. Ontario Ministry of Energy, Profile of Energy Project Expenditures, 1985/86.

B-36. Pacific Gas and Electric Company, Energy Management Conservation Activities: 1986 Plans, December 1, 1985.

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B-38. Rosenfeld, A.H., and Levine, M.D., Least Cost Utility Planning Initiative, Statement before the Subcommittee on Energy Development and Applications of the Committee on Science and Technology, U.S. House of Representatives, September 26, 1985.

B-39. Rosenfeld, A.H., Progress in Energy-efficient Buildings.

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B-46. Synergic Resources Corporation, Assessment of Conservation As A Utility Resource Option, November 1984.

B-47. Synergic Resources Corporation, Implementing Strategic Conservation Programs, October 1984.

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B-51. United States Congress, Office of Technology Assessment; New Electric Power Technologies: Problems and Prospects for the 1990's, OTA-E-246, July 1985.

B-52. United States Department of Energy, Solar Energy Research Institute; A New Prosperity: Building a Sustainable Energy Future, Brick House Publishing, 1981.

B-53. Nevada Attorney's General Office of Consumer Advocate, Resource Planning Workshop, May 14, 1986.

B-54. Nevada Attorney's General Office of Consumer Advocate, Communications with Nevada Power Corporation, December 1985.

B-55. Nevada General Order 43, "Plans to utilize Resources by certain Public Utilities".

APPENDIX D

LIST OF PUBLIC/INTEREST GROUPS THAT SENT WRITTEN BRIEFS

ASSOCIATION OF POWER CONSUMERS IN ONTARIO

No. 2 ONTARIO INSTITUTE OF AGROLOGISTS
by D.A. McArthur

No. 3 ONTARIO CHAMBER OF COMMERCE
by B.R. Wilson

No. 5 CANADIAN ELECTRICAL ASSOCIATION
by Wallace S. Read

No. 6 ONTARIO FEDERATION OF LABOUR
by John Eleen

No. 8 THE UNITED CHURCH OF CANADA

Nos. 10, 11 TASK FORCE ON THE CHURCHES AND CORPORATE RESPONSIBILITY
by David Hallman

No. 1 ONTARIO MINING ASSOCIATION
by Patrick Reid

No. 13 THE CONSERVATION/RENEWABLE ENERGY INDUSTRY COUNCIL
by Brian Kelly and Jeffrey Passmore

No. 15 NISHNAWAKE-ASKI NATION

No. 16 CONSUMERS' ASSOCIATION OF CANADA

No. 17 ONTARIO FEDERATION OF LABOUR

No. 18 MUNICIPAL ELECTRIC ASSOCIATION

Nos. 50, 64 ONTARIO CATTLEMEN'S ASSOCIATION

No. 65 THE NORTH SHORE DEVELOPMENT ASSOCIATION

No. 66 ALGOCEN REALTY HOLDING LIMITED

TORONTO NUCLEAR AWARENESS

APPENDIX E

COMPENDIUM OF CONSERVATION PROGRAMS

UTILITY CONSERVATION PROGRAMS

Summary Chart

Degree Of Utility Involvement	Program Type	Examples*	Function	Advantages	Disadvantages
LOW	Information	. Information Road show (Nova Scotia) . Enersave (EMR) . Easy On Energy (Manitoba)	. Inform users about energy saving measures	. Inexpensive . Very little accounting . Shows self-help tips . Potential to reach large numbers of users	. Low results . Little or no incentive to change behaviour
	Research And Pilot Projects (information gathering)	. Hood River Conservation Project (BPA)	. Research and pilot projects to gain experience . Educate customers	. Provides necessary information base for utility prior to large scale investment	. 4-6 year lead time from conception to analysis of results
	Technical Assistance	. REAP (Ontario) . Energain (Quebec) . CHEC (Manitoba)	. Provide audits to encourage customers to save energy	. Good customer relations tool . Inexpensive . Good lead into financial incentive	. No guarantee that customer will act
HIGH	Direct Financial Incentives	. RECAP (Jersey Central) . The Great Energy Rebate Program (PG&E) . Good Cents (Alabama) . Heat Pump Program (Kansas)	. Outlay of money to obtain direct savings	. Very effective in obtaining savings . Ensures use of conservation methods	. Little detailed evaluation exists on cost effectiveness

* Descriptions of these and other examples follow this chart

INFORMATION PROGRAMS

1. Information Road Show (Nova Scotia Power)

NSP has developed a travelling information show that promotes 'wise and effi-cient use of energy'. The presentations are usually sponsored by local, charitable or service organizations who use this opportunity to sell tickets and raise funds.

2. Enersave (Energy, Mines And Resources, Canada)

A federally operated information clearinghouse. The program can be accessed by toll-free phone from anywhere in the country. The clearinghouse explains conservation programs and offers technical advice and reading material.

3. Easy On Energy (Manitoba Hydro)

An hour long TV show which features energy saving recipes and tips on the wise use of electrical appliances combined with an 'Easy On Energy' calendar containing conservation tips.

4. Energy Saver Devices Program (Pacific Gas And Electric)

Use of bill inserts to notify and encourage customers to purchase low-flow shower heads, automatic clock thermostats, fluorescent light converters, water heater blankets and weatherstripping.

5. Energy Conservation Centre (Pacific Gas And Electric)

A clearinghouse on energy conservation information with the capability to handle over 2,000 calls daily. The centre also processes applications for 'instant credit' requests for conservation financing. It is estimated that eight percent of PG&E customers have contacted the Centre.

6. Energy Information Clearinghouse (Northern States Power)

Over 100,000 calls answered in 1982. Forty percent were handled by prerecorded message.

7. Lease Impact Systems (Pennsylvania Power And Light)

An information and demonstration program designed to encourage customers and builders to select electrical systems that have the least impact on utility peak loads. Dual fuel heat pumps and supplemental storage electric heat pumps are promoted.

RESEARCH AND DEMONSTRATION

1. Hood River Conservation Project (Bonneville Power Administration)

Background:

The Hood River Conservation Project is a major three and one-half year research effort (mid 1983 through 1986), funded by the Bonneville Power Administration and run by Pacific Power and Light. Other active groups include:

- The Regional Council (established by the PNW Electric Power Planning and Conservation Act)
- PNW Utilities Conference Committee
- Natural Resources Defense Council
- NW Public Power Association.

Through HRCP, BPA will attempt to weatherize all electrically heated homes in the Hood River, Oregon area within a 24-month period. It is a model effort designed to identify and document the effects of residential conservation when implemented within a limited geographic area over a short time. The study will identify the levels of penetration that can be achieved by vigorously marketing residential conservation services and measures. All costs associated with the marketing effort are tracked.

The Project is designed to accomplish five specific research objectives:

¶ To determine the maximum realizable penetration rate of potentially cost-effective residential weatherization measures

¶ To determine the impact of residential conservation on the transmission and distribution system, individual customer load characteristics and kilowatt-hour usage

¶ To determine the effectiveness of general media, personal contact and community approaches to conservation marketing

¶ To assess the characteristics of community dynamics under maximum conservation program conditions

¶ To determine the costs associated with the development and implementation of the maximum conservation effort.

The town and county of Hood River, Oregon was selected as the location to conduct this experiment because the area is geographically delimited. The county has a population of about 15,000, roughly two-thirds of whom are served by PP&L and the remainder by Hood River Electric Cooperative.

HRCP offers a package of "super" retrofit measures. BPA (through the project) pays for installation of these measures up to a cost-effectiveness limit of $1.15/first-year kWh saved (almost four times the limit in BPA's region-wide Residential Weatherization Program. Thus HRCP offers the chance to determine levels of retrofit installation when cost to the household

and prior retrofit activities are largely eliminated (See Table for conservation measures).

The cost of the research effort is estimated to be $19.7 million. Of the total project budget, 72.2 percent ($14.2 million) will support residential weatherization measures; 19.3 percent ($3.8 million) is allocated to evaluation; the remaining 8.5 percent ($1.7 million) will sustain Project marketing, communications and administration.

Although the cost-effectiveness limit was set at $1.15/first-year kWh saved, the total HRCP cost, averaged across the completed homes that had at least one major retrofit installed, was only 66 cents/kWh. This suggests that most of the savings were achieved at much less than the maximum allowable cost.

Rationale for Project:

In theory, a perfect conservation program, would install all energy-efficient measures to all eligible homes. However, in many cases, households choose not to participate, or do not install all recommended measures (because of cost, lack of interest, insufficient or inappropriate marketing, etc). There is little known about the gap between the ideal potential and reality. The HRCP affords a unique opportunity to examine the difference between potential and practice. HRCP is therefore intended to define the maximum limits of a utility-operated residential retrofit program, one in which cost to the household is not a barrier and in which the level of retrofit measures installed is beyond that conventionally installed.

The three-year study is an outgrowth of the Pacific Northwest Electric Power Planning and Conservation Act (U.S. Congress, 1980). This legislation required the NW Power Planning Council to develop a 20-year plan for the Pacific NW region's electricity demand and supply.

Mechanics of the Project:

The HRCP process is straightforward. A household contacts the HRCP office to sign up for the program. An auditor then inspects the house in order to identify cost-effective retrofit measures. The auditor examines existing levels of insulation in the ceiling, walls, floors and heating ducts as well as windows and exterior doors (for glazing) and assesses the need for clock thermostats and/or air to air heat exchanger. Finally, the auditor installs several low-cost measures (outlet gaskets, water heater insulation, hot water pipe insulation and low-flow shower heads.

Final determination of cost effectiveness is made when the contractor proposal is reviewed by HRCP staff relative to the cost-effectiveness limit. If the package is too expensive, the household can choose to pay the additional amount or drop to the least cost-effective measures.

By May of 1985, about half the eligible homes had been completed. Conservation potential in existing homes is difficult to define and to determine. Different definitions are feasible depending on how one considers measures that are not applicable, that cannot be installed because of physical limitations, that are already partially or fully in place, or that households do not want to install.

The HRCP combines extensive social survey and social observation with state-of-the-art techniques for measurement of household energy consumption and 'load'.

TECHNICAL ASSISTANCE

1. **Residential Energy Advisory Program** (Ontario Hydro)

REAP is a home audit program aimed at improving residential energy efficiency. The program consists of an on-site audit that examines thermal efficiency and insulation. Due to new marketing directives (i.e., to increase electricity sales), this program now seems to receive less emphasis.

2. Energain (Hydro Quebec)

Launched in 1981, Energain offers a low-cost energy analysis for residences covering thermal insulation, heating systems and consumption habits. cost of the audit ranges from $35 for a single family dwelling to $600 for a building containing 51 units or more.

3. Cut Home Energy Costs (Manitoba Hydro)

CHEC provides on-site residential energy audits for $20 (refundable if any of the recommendations are implemented within a year). In connection with this program is a low-interest loan program.

Manitoba Hydro offers low interest loans (9.5% in February of 1985) of up to $10,000 for labour and materials. The term of the loan is up to 20 years and payments are added to the electric bill. Loans are available for the purchase and/or installation of insulation, storm doors and windows, caulking and weather-stripping.

4. Electric Design Service (Nova Scotia Power)

NSP offers an electric design service free of charge aimed at new construction in all sectors. Builders and architects are free to approach NSP for assistance. Plans are reviewed in regard to allowable design standards, thermal insulation, proper equipment sizing and cost estimation. NSP provides 1,800 to 2,000 evaluations per year.

5. Energy Conservation Service And Investment Program (Northern States Power)

The Minnesota Energy Conservation Service (MECS), active between April 1, 1981, and December 1982, mailed energy audit offers to almost 350,000 of its Minnesota customers. Almost 12,000 audits were conducted during this period at an average cost to NSP of $145 each (a fee of $10.00 was paid by households).

During this same period, the St. Paul Public Utility Conservation Investment Program (PUCIP) offered low interest loans to St. Paul area households for installation of retrofit measures recommended by the MECS. Loans were offered at 7 percent and 9.75 percent interest. About 25 percent of eligible households applied for and obtained loans.

About 450 PUCIP loans were made between the fall of 1981 and September 1982 averaging almost $3,000 per home. The net savings of households that received an audit averaged four MBtu/year. The net savings for households that received both an audit and low-interest retrofit loan was 24 MBtu/year.

6. Audit And Insulation Programs (Tennessee Valley Association)

Residential audits are conducted free of charge, and over 30 percent of TVA customers have received the audit. Commercial and industrial customers are provided with walk through and comprehensive audits. financing is provided at TVA's Zero Interest Loan Program. TVA also offers heat pump and solar-assisted water heating financing at interests rates that have ranged between 11 to 13.4 percent.

7. Wrap-up/Seal-up Program (Northeast Utilities Company)

Wrap-up/Seal-up is a direct installation/subsidy program. A toll-free hotline is used to handle requests and over 60 installers are used to complete 1,200 service requests per week. Installation costs vary for each of the 11 low-cost measures installed. Low-income groups are served at no direct charge. By 1984, over 85,000 customers had been serviced.

The state set aside $250,000 for the pilot. NUC paid the administration costs and CONN SAVE (a non-profit consortium) provides, without cost, the detailed supplemental form. The state is billed for actual services rendered, either by contractor or themselves, and NUC is billed $42.50 per dwelling unit to cover administrative costs.

It is estimated that the program saves just over 100,000 barrels of oil equivalent each year.

DIRECT FINANCIAL INCENTIVES

1. Residential Energy Conservation Action Program (Jersey Central Power And Light Company)

RECAP is a direct installation/subsidy program where the customer pays no direct charge for weatherization. Conservation measures are installed at contractor risk. JCP&LC reimburses contractors at a rate of 5.5 cents/kWh saved. Customers then go on time-of-use rates and direct water heater load control.

The program works as follows:

¶ The utility company enters into a contract with one or more energy conservation companies to provide conservation retrofits to a specified number of the utilities customers

¶ The conservation company conducts free energy audits for residences in a particular area. If need for retrofits is established, and it is cost effective, the conservation companies install them free of charge

¶ The utility pays nothing to the conservation company for the measures installed, and there is never any obligation on the utility to pay anything for the retrofits

¶ The conservation company is paid by the utility for actual reductions in energy consumption - there must be a measured savings

¶ The payments are made and the savings monitored over a period of several years to insure that the conservation company has a continuing interest in the retrofitted homes.

Twenty-one million dollars has been paid to conservation companies over five years, resulting in 156,000 homes retrofitted. Savings are estimated at $104 million over ten years.

2. The Great PG&E Energy Rebate Program (Pacific Gas And Energy)

This program offers PG&E's 500,000 commercial, industrial and agricultural customers rebates for purchasing and installing more energy-efficient motors, lighting and other equipment. The average rebate is about 40 percent of the purchase price. The rebates have a ceiling of $100,000 per customer per program and are offered to encourage businesses to invest in energy-efficient equipment.

Industrial and institutional customers are served through two basic and comprehensive programs: Energy Management and Energy Management Incentives. Through 1985, the Energy Management program (in compliance with the state of California's Loan Management Standards) completed energy utilization audits for at least 87 percent of its commercial customers using more than 100,000 kWh per year. These program include:

¶ Small Business Incentives: Providing rebates on 23 energy efficient projects including lighting, controls and weatherization or PG&E non-residential customers who use less than 100,000 kWh a year

¶ Customized Energy Management Incentives: A flexible program allowing businesses to tailor conservation programs to fit their own needs. PG&E analyzes the energy savings and pays rebates based on the value of the savings and the cost of the changes

¶ Energy-efficient Motor Incentives: Offers rebates amounting to $10 per horsepower on motors using 7.5 to 200 horsepower design 'B' motors

¶ Commercial Refrigeration Incentives: Rebates equal to $5 a linear foot for strip curtains and $25 a linear foot for glass doors are offered to supermarkets and other refrigeration customers

¶ Low-Temperature Dishwasher Incentives: Aimed at hospitals, schools and restaurants, this program encourages customers to switch to low-temperature dishwashers with cooler rinse temperatures. The rebate equals 50 percent of the purchase price. Non-profit institutions receive an additional 25 percent

¶ Street and Highway Lighting Incentives: Offers rebates of up to $72 a lamp for changing from mercury vapor and incandescent lamps to more efficient high-pressure, sodium vapor street lamps

¶ Lighting Conversion Incentives: Offers rebates of up to 40 percent of the purchase price (or $280/kilowatt saved which ever is less), for installing more efficient lighting in offices, warehouses, factories and other places of business.

3. Good Cents Home Program (Alabama Power Company)

Builder receives a rebate of $360 for inclusion of weatherization measures.

4. Heat Pump Program (Kansas Power And Light)

Central A/C conversions to heat pumps are financed at 14.09 percent. Rebates of $200 are available for pumps with an EER of 8.5 or more. For add-on heat pumps, a rebate of $100 is available for heat pumps with 8.5 EER or greater.

5. Appliance Rebate Program (Northern States Power)

The Appliance Rebate Program (ARP) was brought about in response to the 1980 Minnesota Energy Omnibus Act requiring public utilities in the state

to investigate the cost effectiveness and feasibility of conservation as an alternative to investments in new generation.

ARP offers rebates to NSP's residential electric customers, landlords and builders for the purchase of efficient refrigeration appliances, electric water heaters, air conditioners and heat pumps. These appliances were selected because in total, their associated end users represent over 50 percent of the electricity consumption of the residential customer class. Efficient models can thus result in substantial savings. Rebates were chosen as the incentive mechanism in order to lessen the first-cost disadvantage of purchase.

ARP utilized the existing appliance dealers. One thousand, two hundred and fifty local dealers, heating and air conditioning contractors, plumbers and other retailers were invited to participate. They were provided with program manuals (containing rebate schedules, rules and procedures), information on the FTC Energy Guide label, and an explanation of the energy efficient features of appliances.

During the programs first 18 months, (March 1, 1982 to September 1, 1983), NSP processed 29,000 rebates totaling $1.34 million. More than half of this activity took place in the last six months.

<u>6. Zero Interest Program (ZIP) And Cashback</u> (Pacific Gas and Electric)

The program provides loans of up to $3,500 per dwelling unit or single family home at no interest. Up to 12 weatherization measures are eligible for financing (including: ceiling insulation, caulking, weather stripping, water heat blankets, duct wrap, low-flow showerheads and wall insulation). Clients are given 50 months to repay the loan.

Cashback offers rebates of up to 40 percent on self-installed or contracted PG&E approved weatherization measures.

Both ZIP and Cashback are available to owners of multiple unit dwellings. MUD's are audited by PG&E and on the basis of the audit, a loan or grant is made.

In 1983 ZIP costs totaled $39.7 million. 1985 estimates for ZIP, Project Help, Cashback and MUD total 126,000 units weatherized, including 40,500 low-income homes, mobile homes and rental units. Annual energy savings are estimated at 28.3 million kWh.

7. Project Help (Pacific Gas And Electric)

Under Project Help, free weatherization is carried out by PG&E for low income homeowners. Two hundred dollar grants are also available for minor repairs to doors and windows.

As of 1984, PG&E has provided weatherization financing for 145,644 homes totaling $63 million. In addition, 38,127 single family, low-income homes were weatherized under the Direct Weatherization program, which accounts for 150,667 additional conservation measures.

8. Energy Check-up And Weatherization Program (Puget Sound Power And Light Company)

This set of programs provide a ten-year deferred repayment loan or cash grant amounting to 71.8 percent of residential and non-residential conser-vation investments. Non-residential customer energy consumption is monitored for ten years after conservation investments are made.

Other financial programs sponsored by PSP&L are:

- Water Heater Insulation Kit Program: Puget will furnish and install free of charge an insulation blanket for the electric hot water heater

- Solar Rebate Program: Puget will provide a $300 rebate to customers who install a solar water heating system

- Water Heater Efficiency program: A pilot program to replace old hot water heaters with energy efficient tanks. Puget pays the

difference between the standard tank and the super insulated tank

- Low Income Weatherization Program: Puget Power and the State of Washington implemented a joint program in 1982 to provide 100 percent weatherization financing for low-income customers.

9. Energy Efficient Refrigerator Program (Southern California Edison)

A series of programs are offered to families with low and/or fixed incomes such as the distribution of energy saving fluorescent lamps and energy-efficient refrigerators at no cost to the consumer, as well as free weatherization services, central heat pump and clock thermostats, etc. Innovative community grants are available to local governments and community groups for specific energy conservation projects.

APPENDIX F

PAST REVIEWS OF ONTARIO HYDRO AND ELECTRIC POWER PLANNING

OVERVIEW OF PAST REVIEWS

Reporting Year	Reviewing Body	Key Areas Of Recommendations
1972	Advisory Committee On Energy	. Energy outlook and policy implications . Impacts of energy use on the environment . Industrial energy demand . Uranium supply and demand
1972-73	Task Force Hydro	. Legal and institutional framework . Role of Ontario Hydro . Relationship with government . Public consultation . Corporate structure . Nuclear power . Financial policy and rates
1976	Select Committee On Ontario Hydro Affairs	. Bulk power rates and revenue needs . Forecasting and managing demand . Reliability . System expansion
1978	Select Committee On Ontario Hydro Affairs	. Uranium contracts
1979	Select Committee On Ontario Hydro Affairs	. Need for electrical capacity
1980	Select Committee On Ontario Hydro Affairs	. Safety of Ontario nuclear reactors . Management of nuclear fuel works
1980	Select Committee On Ontario Hydro Affairs	. The management of nuclear fuel waste
1980	Royal Commission On Electric Power Planning	. Electric power requirements and conservation . Alternative energy sources . Nuclear power . Bulk power transmission . Land use and evironmental concerns . Decison making

RECOMMENDATIONS RELATING TO ISSUES OF CURRENT REVIEW

Task Force Hydro (1973)

1.1 (b) Ontario Hydro discharge this responsibility in compliance with the overall policy of the Provincial Government

1.10 Hydro establish a procedure whereby representations and appeals from the public can be heard by a body responsible to the senior policy making body of Hydro but not a part of the line organization

1.12 Hydro consider the establishment of ad hoc citizen's task forces to provide for citizen participation in the locating of generating and transmission facilities and in other matters of concern to the public

1.15 To give expression to Government policy for Hydro and to define Hydro's mandate, a contract be drawn up between the Provincial Government and Hydro

2.6 Ontario Hydro planners, in collaboration with Government at the provincial and local levels and with interested individuals and citizen groups, develop an open planning process to produce economically and technically feasible plans for transmission and generation facilities acceptable to the public and with minimum adverse environmental impact

4.27 There be established an Electricity Rate Review Board, appointed by the Lieutenant-Governor in Council, to publicly hear appeals and review proposals for changes in wholesale and direct industrial rates and to review the principles underlying the establishment of retail rates across the Province.

Macdonald Select Committee
A New Public Policy Direction
For Ontario Hydro (1976)

> "The explosion of public involvement in the 1970s is symptomatic of the new era in which Hydro finds itself. And yet, while the public and Government are increasingly involved with Hydro, there is no single forum or combination of forums that provides an overall public policy direction."

II-1 The Ontario Government develop and clearly articulate government policy towards Ontario Hydro

III-3 The Ontario Government increase insulation standards in all new homes to a level that is justifiable on the basis of expected future energy prices

III-4 The Ontario Government make financial incentives generally available to encourage the installation of energy saving equipment in homes throughout Ontario

III-5 The Ontario Government publicly urge the government of Canada to set minimum energy efficiency standards for appliances and to require all manufacturers to show on each appliance normal electricity use relative to the minimum standard

III-6 The Ontario Government set insulation standards that can be justified on an economic basis for electric water heaters

III-7 Ontario Hydro and the municipal utilities cease bulk metering apartments and townhouses and study the feasibility of retrofitting existing bulk metered building

III-8 The Ontario Government make available additional research funds for the development of energy saving technology

III-9 The Ontario Government make financial incentives generally available to encourage investment in energy conservation-related equipment in the commercial sector

III-13 The Ontario Government ensure that the overall level of electric rates should not be increased solely for conservation purposes

> "The recommendations above clearly indicate that much of the need for action is with the Government rather than Hydro. Therefore, the Committee believes strongly that the targets will only be met if they are approached as a commitment by both Hydro and the Government."

III-14 Ontario Hydro, the Ontario Government and the Ontario Energy Board consider the effective and efficient use of electric energy an issue of equal importance to the continuance of a reliable and adequate supply. Further, that Ontario Hydro's specific conservation targets be accepted as a Government commitment and be included in all system expansion planning

III-15 Ontario Hydro consider the design of its rates to be an important tool in furthering reasonable load management objectives

III-16 Ontario Hydro and the municipal utilities actively promote the sale of interruptible power to industry and ensure that the pricing of interruptible contracts reflects the real saving to Ontario Hydro

III-17 The Ontario Government and Ontario Hydro develop and implement a load management program

III-18 Ontario Hydro develop immediately a program specifically aimed at reducing peak demand by a target amount of one percent per annum to 1985

III-22 Ontario Hydro change its planning process to emphasize meeting Ontario's electrical energy needs after implementation of conservation and load management programs, with the minimum amount of new generation that is consistent with sound planning

III-25 The Ontario Government accept responsibility for launching and directing a program that will ensure Ontario is making optimal use of by-product heat energies from thermal electric generating stations.

Finally, the Committee noted the heavy reliance on nuclear generation and has several concerns. First, Hydro's massive nuclear program has never been the subject of careful public scrutiny.

III-29

(i) The Ontario Government accept the thrust of the Committee's report as government policy and instruct Hydro to being immediately to implement the Committee's recommendations

(ii) The Ministry of Energy coordinate the Government policy and monitor Hydro's implementation on an ongoing basis

(iii) The Ontario Government appoint a select committee of the legislature to whom Hydro will report on a periodic basis on its new system expansion plan and its implementation of the committee's recommendations commencing in the Spring of 1977.

Porter Commission
Royal Commission On
Electric Power Planning

3.1 Through the development of demand scenarios based on end-use data, future planning philosophy should be reoriented to emphasize demand management increasingly rather than maintain the focus on supply expansion, as is traditional

3.3 A comprehensive energy end-use data base for the province should be developed as soon as possible, and Ontario Hydro, in addition to macro-economic or "top down" forecasting models, should develop complementary models based on the detailed building up of electricity demand on an end-use basis. Ontario and federal government ministries and agencies should support Ontario Hydro's efforts to fill the remaining data gaps

3.5 As part of a larger objective of planning for an improved annual load shape and higher load factors and as a means of increasing the resiliency of the electric power system and reducing Ontario's dependence on crude oil, Ontario Hydro should give high priority to

demonstrating the technical and economic feasibility of new and retrofit hybrid electric/fossil space-heating systems

4.1 During the next decade the Ontario Government and Ontario Hydro should actively support the demonstration of fluidized-bed combustion with special reference to its future role in the generation of electric power

4.2 The Ontario Government should support the demonstration of biomass energy projects, including gasification of forest and agricultural residues, testing methanol technologies, evaluating ethanol potential and generation of biogas

4.3 During the next decade the Ontario Government should continue this program to demonstrate the suitability of solar space heating and water heating in the Ontario context with special reference to its potential role in energy conservation

4.4 The Ontario Government and Ontario Hydro should make every effort to convert the "moth balled" gas-fired boilers at the R.L. Hearn Generating station to burn refuse or refuse-derived fuels

4.5 The Ontario Government and Ontario Hydro should assign high priority to the demonstration of industrial co-generation

5.18 No further development of the 1,250 MW CANDU reactor, even in the concept stage, should be undertaken by Ontario Hydro. Any additional nuclear base-load power stations in the post-Darlington period should be based on 850 MW CANDU reactors. We believe that such standardization will facilitate reactor safety as well as optimizing the average capacity factors of these stations

5.21 Nuclear power should no longer receive the lion's share of energy R&D funding, and R&D priorities sin the nuclear field should be focused primarily on the human factor in reactor safety, on the management and disposal of wastes at the front and back ends of the fuel cycle, and on the decommissioning of nuclear facilities

7.3 The studies aimed at strengthening the electricity interchange capability with Quebec should be expedited, and in particular they should be extended to ensure close collaboration between Ontario Hydro and Hydro-Quebec in the future planning of their respective systems for the mutual benefit of both provinces

7.4 Ontario Hydro should cooperate with Manitoba Hydro in studies aimed at strengthening electricity interconnections and the purchase of substantial blocks of hydraulic power from the lower Nelson River; there should be closer collaboration between the two utilities in the future planning of their respective systems for the mutual benefit of the two provinces

7.5 The interconnections between Ontario Hydro and neighbouring utilities in the United States should be strengthened

10.1 Over a period of 10-20 years, efficiency goals for all energy-intensive industrial processing equipment, machines, and systems should be established by the Ministry of Energy. In setting these goals, efficiency standards already being achieved in several foreign countries, notably Sweden and West Germany, should be taken into account. Efficiency goals should be applied in the first place to the pulp and paper industry, the iron and steel industry, the chemicals industry, the petroleum refining industry, and all heat-treating operations

10.2 Mandatory heating, insulation, and lighting standards should be enacted for new residential and commercial construction, and these standards should take into account the optimum utilization of passive solar energy measures

10.3 Progressively stricter efficiency standards for all major energy-consuming appliances, such as water heaters, refrigerators, home furnaces, and air-conditioners, should be put into effect through legislation

10.4 Direct government loans and other economic incentives should be made available to finance the retrofitting of houses, multi-unit

residences, and some commercial buildings with conservation equipment, including insulation and, where appropriate, storm windows and shutters

11.1 Ontario should not attempt to compete aggressively for power-intensive industry with provinces with large remaining hydraulic resources

11.4 Time-differentiated electricity rates (seasonal and time-of-day) should be introduced as soon as possible to as many classes of customers as practicable. Seasonal rates should be introduced first, to ensure that the higher long-run costs of supplying low-load-factor space-heating loads are properly recovered. Time-of-day rates should be phased in as day-night electricity supply-cost differentials become significant and obstacles to metering small customers are overcome

11.8 To encourage the prudent and efficient use of electricity, such features as declining block rates, uncontrolled flat-rate water heaters, and bulk metering of new electrically heated apartment buildings should be modified or eliminated

11.10 In analyzing the options for increasing the province's capacity for energy self-sufficiency, a systems approach should be adopted in which the incremental costs of conventional electricity generation are compared with the unit costs of conservation or renewable energy technologies, taking into account the load characteristics of each end use

11.11 Because of institutional and financial obstacles facing decentralized, heavily "front-ended", alternative energy and conservation programs, and in view of the redeeming social importance of reducing Ontario's oil dependency, provincial loan guarantees, tax and fiscal incentives, and direct financial support should be made available to promote industrial co-generation, heat-loss and building-design standards aimed at optimizing energy-conservation investments, solar water heating, and passive solar systems. The setting up of a mini-utility, backed by the Ontario Energy

Corporation, should be considered, to support industrial co-generation initiatives

12.1 Ontario Hydro should be encouraged to continue and, where necessary, to expand its public participation program to ensure that the public is fully involved. Ontario Hydro should adopt joint planning processes whereby real decision-making authority is shared with, and in some cases (see recommendation 6.3) left to the initiative of, citizen representatives

12.3 In order to enhance the optimum utilization of electricity, both public utility commissions and the Regional Offices of Ontario Hydro should be adequately financed and encouraged to sponsor, in their areas educational programs, seminars, and workshops in energy utilization and conservation

12.4 Ontario Hydro should find practical means to give effect to its commitment to greater openness by commencing to publish a technical-papers series, containing accounts of technical, scientific, and socio-economic research in language understandable to the layman. These publications should be made widely available to libraries across the province

12.5 A clear statement of the objectives and responsibilities of the utility, especially as they relate to the social objectives as endorsed by government, should be issued by the Ministry of Energy

12.9 The Ontario Energy Commission should be provided with a modest increment in staff and consulting budget over and above that of the existing Ontario Energy Board. The designation "Commission" as against "Board" was selected not only to suggest a break from the past but also to provide a broader umbrella to embrace a policy advisory function as well as the traditional regulatory function. The indications are that the additional staff requirements would be small

12.10 The principle of funding of public interest groups from the public purse should be adopted in connection with energy and environ-

mental hearings in the future. Only in this way will it be possible for disparate views to be aired adequately in public hearings. The public interest funding program should be iproved in two areas:

¶ The requirement of adequate accounting practices should be written into contracts between the groups and the funding body

¶ Wherever appropriate, an essentially inquisitorial rather than adversarial approach should be adopted in order to reduce the expenses incurred by participating groups.

APPENDIX G

ONTARIO HYDRO'S DEMAND AND SUPPLY OPTIONS STUDY

ONTARIO HYDRO'S DEMAND AND SUPPLY OPTIONS STUDY

Phase I: An Initial Review Of The Options was comprised of five main steps:

1. Assembling and updating the data regarding the options (e.g., cost, availability, lead times)

2. Evaluating each option against a number of criteria and determining whether any can be "screened out" from further analysis

3. Developing an initial ranking of options, based primarily on cost, as an aid to structuring the work in Phase II

4. The public consultation process was initiated

5. The results of Phase I were presented to the Board of Directors in July 1985.

Phase II: Plan Analysis is the phase the DSOS is currently in. The major steps of this phase are:

1. Define a number of broad alternative plans, each of which has distinct rationale (or purpose)

2. Identify one or more programs (i.e., combinations of options) for each of the alternative plans

3. Assess each of the programs against a number of evaluation factors including:

   - Long-run economics
   - Customer cost
   - Risk/flexibility/reliability
   - Ontario Hydro financial impacts
   - Public Acceptance issues
   - Environmental impact
   - Provincial economy impact.

4. Each of the programs defined for a particular alternative plan will be assessed

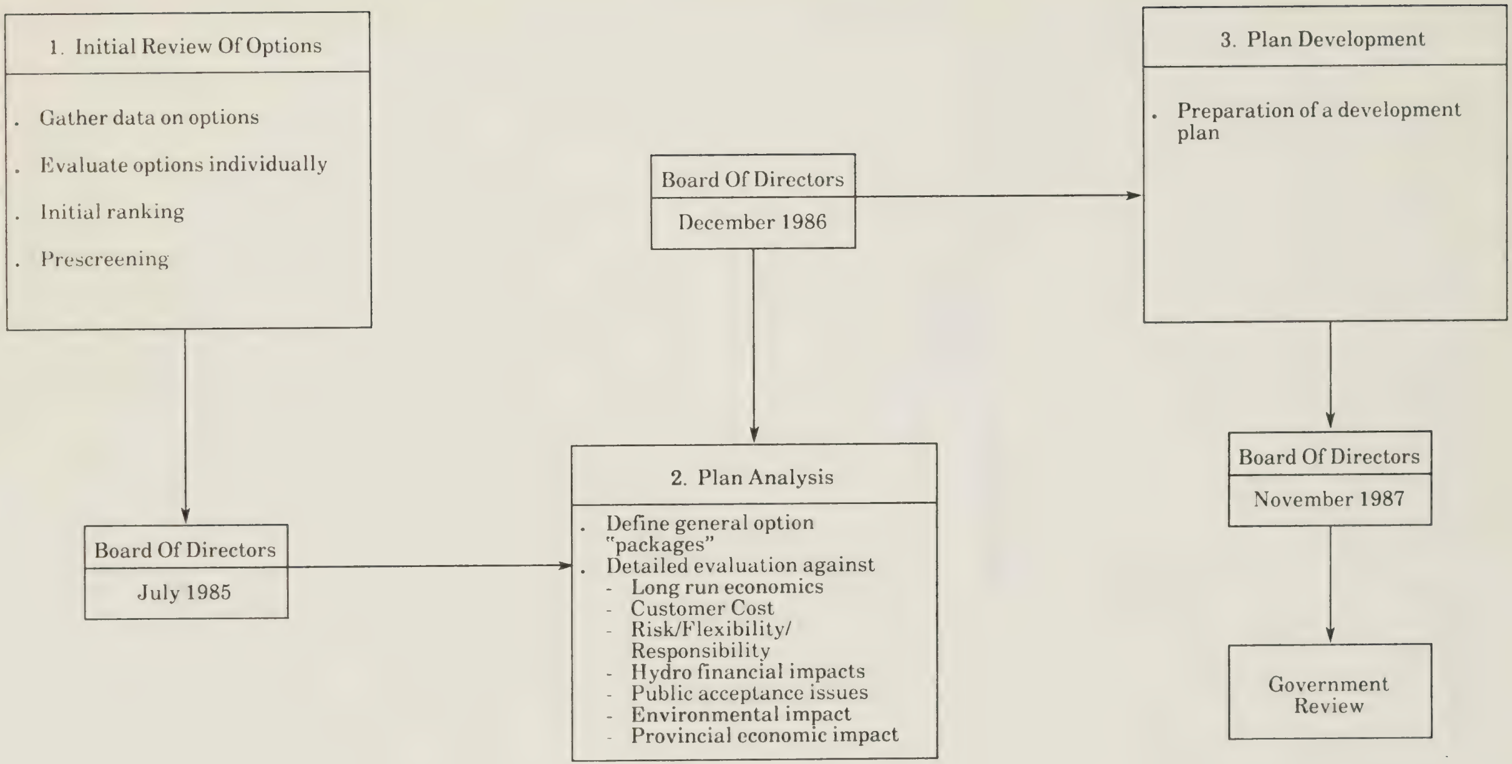
   - Cost (excluding the risk/flexibility/reliability factors and assuming the most probable load forecast);
   - Reliability (to determine the appropriate reserve margin to reflect the specific mix of lead times for the options combined in the program); and
   - Flexibility and risk (to assess the ability of the program to adapt to changing conditions).

5. The results will be presented to the Board of Directors in December 1986.

<u>**Phase III: Plan Development**</u> will involve the preparation of a development plan, or a framework for planning, approval by the Board of Directors, government review and continuing public consultation. An internal assessment of the short-term impacts on corporate work programs will also be made.

The final phase, <u>**Phase IV: Plan Approval**</u>, is scheduled to be completed by November 1987.

ONTARIO HYDRO'S DSOS



APPENDIX H

THE HIDDEN COSTS OF ELECTRICITY OPTIONS IN ONTARIO

(Excerpts from Exhibit 57)

THE HIDDEN COSTS OF ELECTRICITY OPTIONS IN ONTARIO

(Excerpts from Exhibit 57)

5.0 Summary and Conclusions

This study has examined the embedded subsidies, or hidden costs of electricity generation in Ontario. By not considering these costs when choosing between available technologies to produce electricity, and alternatives to the present technologies, resources are not being efficiently allocated from society's point of view.

The subsidies analyzed, which we do not claim to be all encompassing, include: research and development, demonstration projects, direct support to users, debt guarantee, tax incentives, advising services, and education. A summary of the findings for Ontario are presented in Table 5-1. The debt guarantee comprises the largest subsidy by the Ontario government, with a strong bias to nuclear generation exhibited by this particular subsidy. Table 5-2 summarizes the results for the Ontario subsidy received from the federal government. While the largest part of the total subsidy was directed to nuclear R & D, it should be recognized that this sum is scheduled to be dramatically reduced over the next 5 years, to half the present budget. Moreover, both the CHIP and COSP programs have ended which, on an after-tax basis, represent a total subsidy of $21.2 million in 1984.

Finally, Table 5-3 presents a summary of the combined federal and provincial subsidies to Ontario electricity options. This table clearly points out that almost two-thirds of the total subsidy in 1984 was to nuclear generation. In contrast, less than 5 per cent was directed to alternative technologies and less than 13 per cent was directed to energy conservation.

Table 5-1

ONTARIO SUBSIDIES TO ELECTRICITY OPTIONS IN 1984
($ million)

Option	Research and Development	Demonstration	Direct Support to Users	Debt Guarantee	Other[1]	Total
Electricity						
Nuclear	34.3[5]			223.8		258.1
Fossil	2.1[5]			65.0		67.1
Hydraulic	1.0[5]			46.2		47.2
Alternatives[2]	12.3 11.6[3] .7[5]					12.3
Conservation	9.1 1.9[3] 4.9[4] 2.3[5]	2.1[3]	5.9 4.9[3] 1.0[6]		5.9[3]	23.0
Total	58.8	2.1	5.9	335.0	5.9	407.7

1. Includes advisory services, education, and program development.
2. Includes solar, waste, wood, fusion, remote power, hydrogen, and small scale hydro.
3. Ontario Ministry of Energy.
4. Ontario Energy Corporation.
5. Ontario Hydro.
6. Residential Energy Advisory Program (Ontario Hydro).

Table 5-2

FEDERAL SUBSIDIES TO ONTARIO ELECTRICITY OPTIONS IN 1984
($ million)

	Research and Development	Demonstration	Direct Support to Users	Tax Incentives	Total
Electricity					
Nuclear	175.0[6]		2.9[3]		177.9
Fossil			2.6[3]		2.6
Hydraulic			2.7[3]		2.7
Alternatives[1]					
	10.0[6]	2.8[7]	3.3[3]		16.1
Conservation					
	15.1[6]	3.4[7]	19.7[2]	23.5 (2.5[5] / 21.0[4])	61.7
Total	200.1	6.2	31.2	23.5	261.0

1. Includes solar, waste, wood, fusion, remote power, hydrogen, and small scale hydro.
2. Canadian Home Insulation Program.
3. Canadian Oil Substitution Program.
4. Federal sales tax exemption.
5. Accelerated depreciation.
6. Office of Energy R & D.
7. Office of Renewable Energy and Conservation.

Table 5-3

FEDERAL AND PROVINCIAL SUBSIDIES TO ONTARIO ELECTRICITY OPTIONS IN 1984 ($ million)

	Research and Development	Demonstration	Direct Support to Users	Tax Incentives	Debt Guarantee	Other	Total
Electricity							
Nuclear	209.3		2.9		223.8		436.0
Fossil	2.1		2.6		65.0		69.7
Hydraulic	1.0		2.7		46.2		49.9
Alternatives							
	22.3	2.8	3.3				28.4
Conservation							
	24.2	5.5	25.6	23.5		5.9	84.7
Total	258.9	8.3	37.1	23.5	335.0	5.9	668.7

What conclusions can we draw from this analysis?

- There appears to be a large imbalance of subsidies between the available options for producing and conserving electricity. This imbalance distorts the allocation of resources in the marketplace.

- The large imbalance of resources, primarily in the area of R & D, occurs at both the federal and provincial levels.

In light of the issues being reviewed by the Select Committee, several key questions can be raised.

- Does the imbalance in subsidies reflect the policy objectives of government?

- Considering Hydro's allocation of resources, are demand and supply options given an equal chance of being selected?

- What opportunities are available to government to rectify these imbalances?

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